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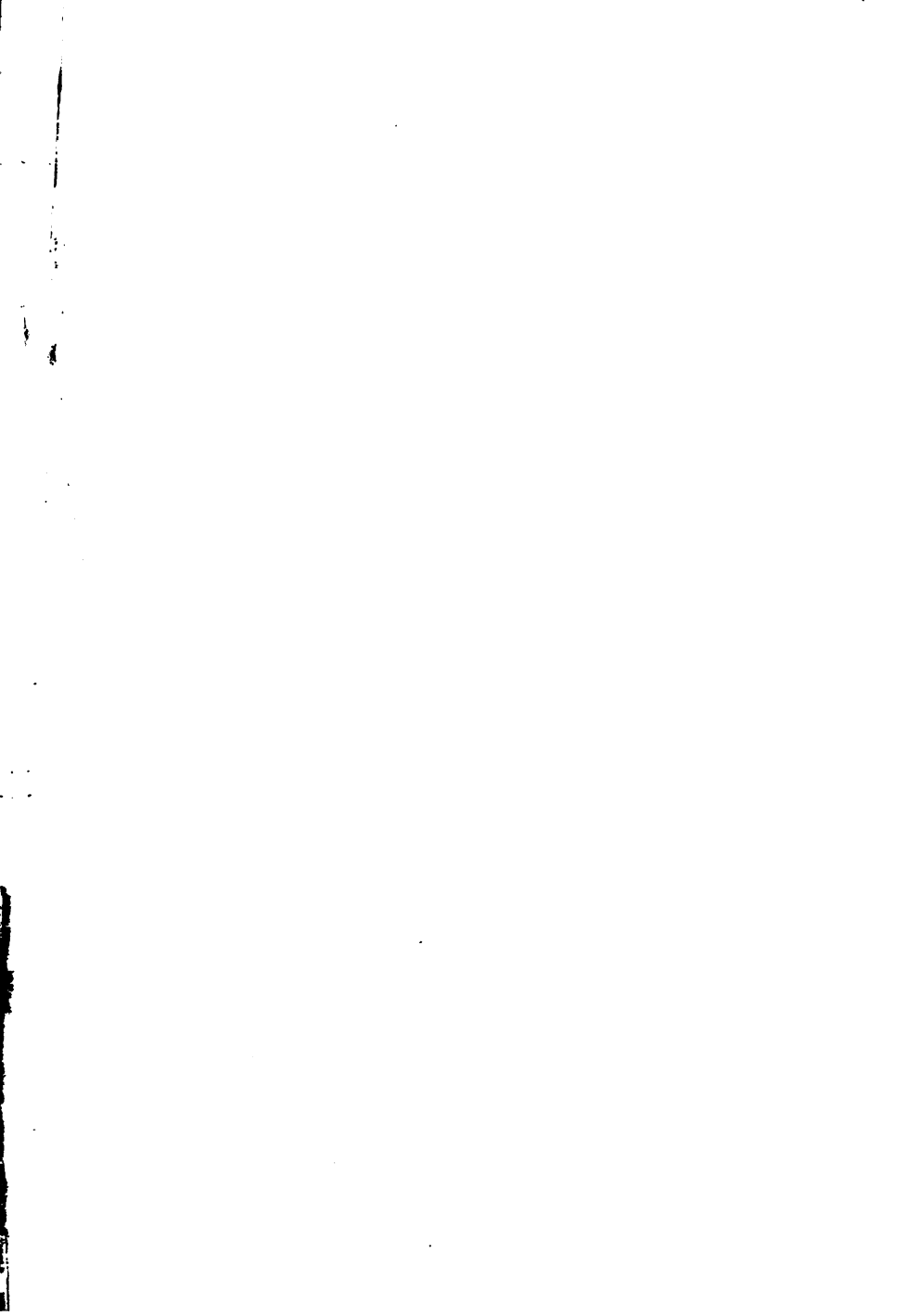
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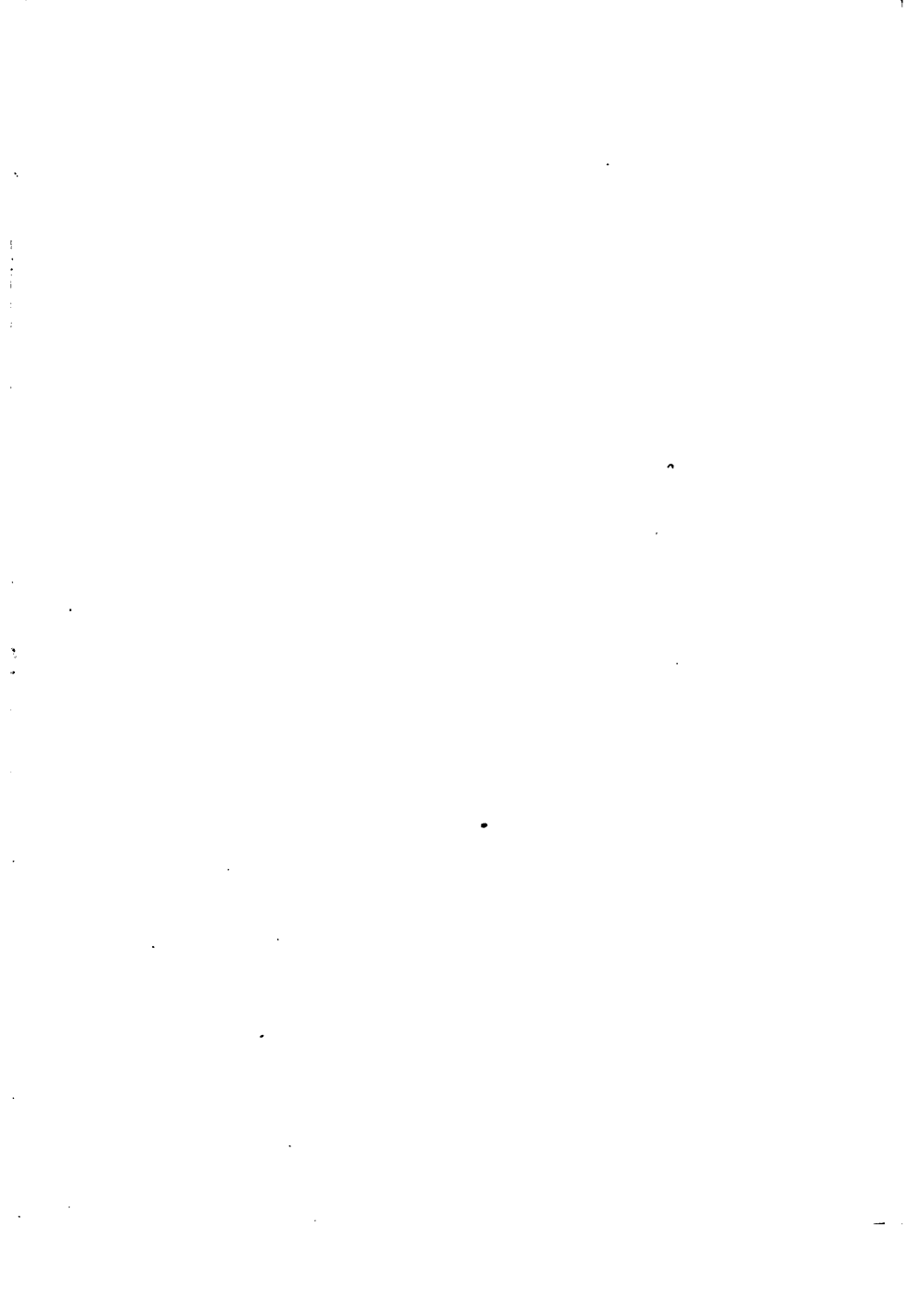


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(c) Mutual Film Corp.

An American camera man (L. M. Burrd) with his special guard in a Mexican campaign

# THE CAMERA MAN

HIS ADVENTURES IN MANY FIELDS

With Practical Suggestions for the Amateur

BY

FRANCIS A. COLLINS

Author of "The Wireless Men," etc.

ILLUSTRATED WITH  
PHOTOGRAPHS



NEW YORK  
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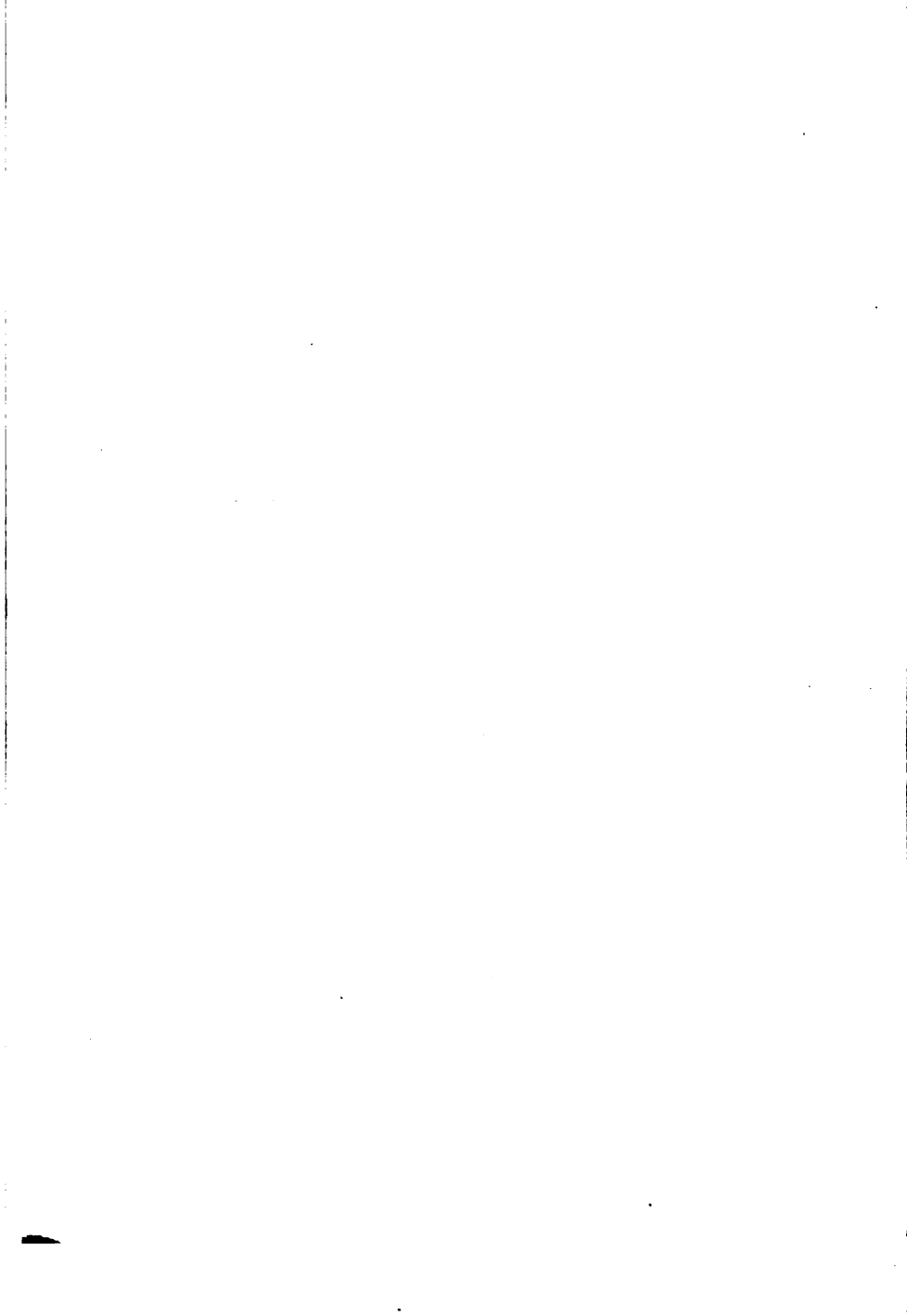
*Published, September, 1916*



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TO  
MY FRIEND  
ALBERT K. DAWSON

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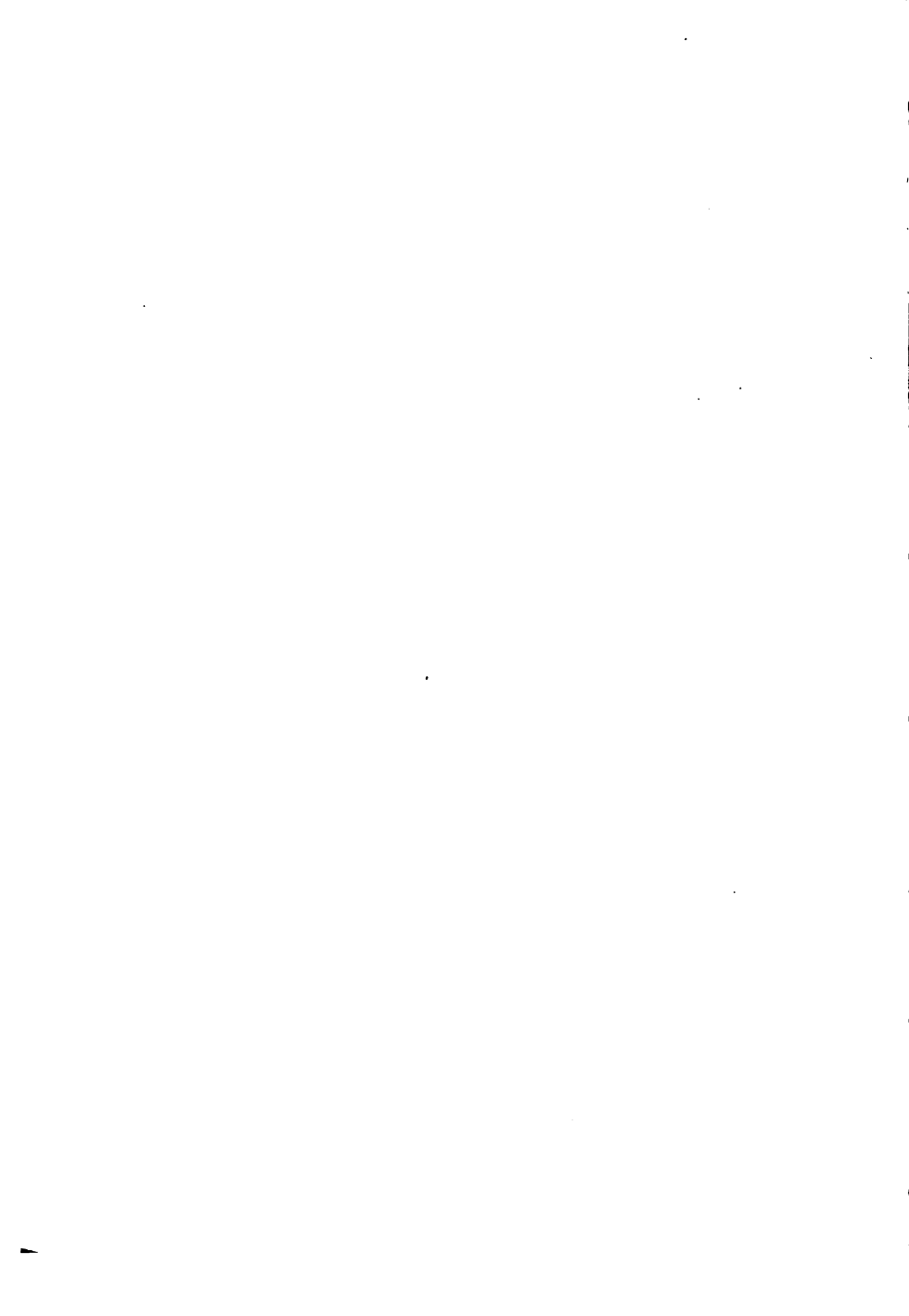
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THE CAMERA MAN



# THE CAMERA MAN

## CHAPTER I

### "WAR STUFF"

**I**N most war photographs, even those taken under fire, the soldiers, it will be noticed, have a smile or at least a friendly glance for the camera man, however tragic their surroundings. The activities of the photographers, who have been mobilized in such force in the great European War, come as a welcome relief among the hardships and perils of the soldiers' life. The camera has become an essential part of equipment, and in the hands of daring and skilful camera men is not the least dangerous weapon the armies have brought against one another. The unprejudiced eye of the camera has preserved on every battlefield a record, impossible in the past, of the suffering and misery of warfare. This, let us hope, will be its highest service, and the work of the camera

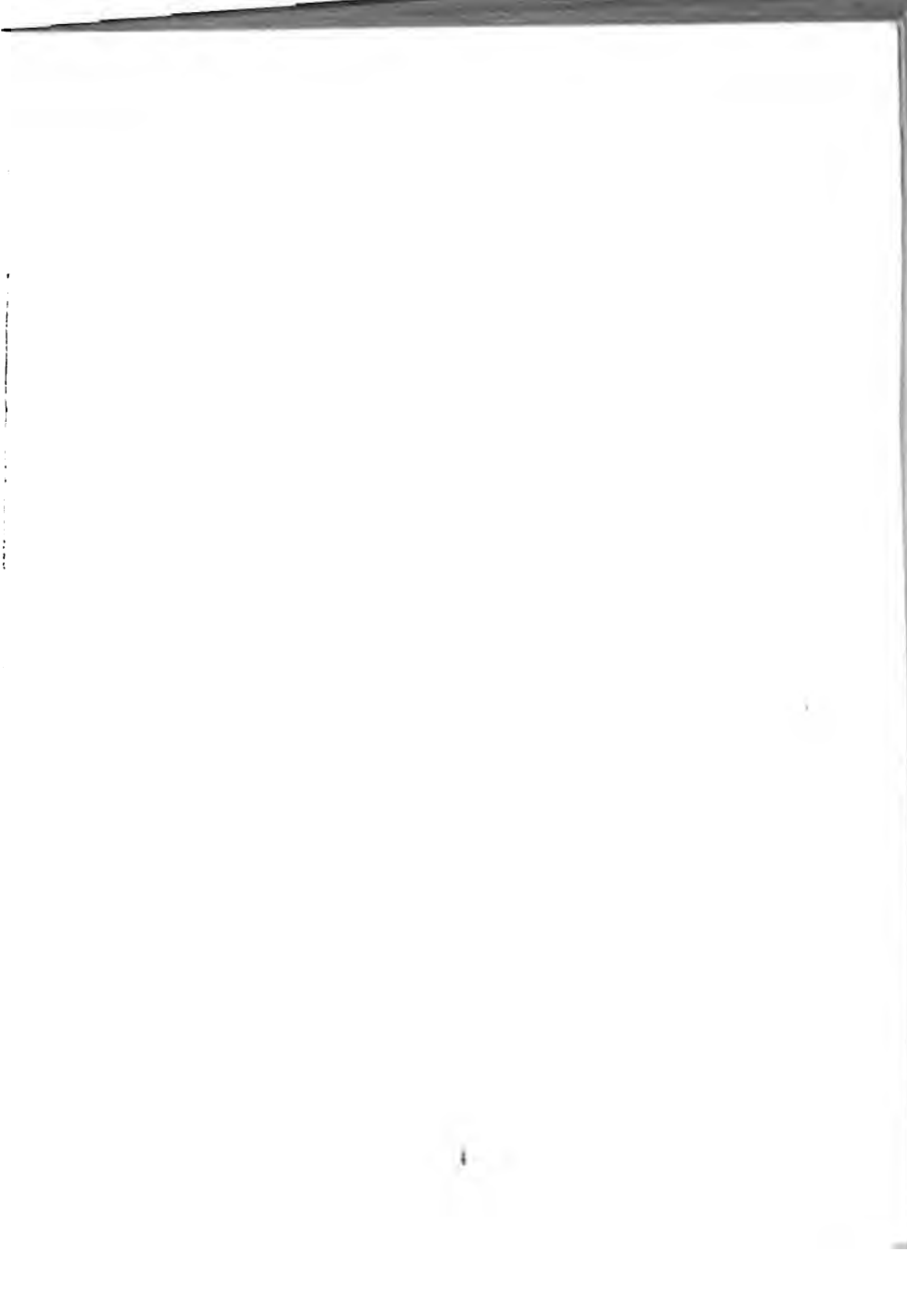
## THE CAMERA MAN

man will help the world in quieter times to realize the horrors and wickedness of war.

Throughout the armies and navies of Europe the camera men have been carefully organized. The photographer is usually a commissioned officer, and becomes a recognized part of the great military organizations. There are hundreds of camera men in the first line trenches; they travel on forced marches with troops of cavalry, artillery, and infantry on every battle front in the broad theater of war; they serve with the engineering corps, in the hospitals, with the aëronautical division, and at sea, and are witnesses of every phase of the army's activity.

When a camera man is enlisted, he is assigned to one of the commanders, and while serving he is responsible to him. The photographer makes his permanent residence at the front at the headquarters of the detachment to which he is assigned. He is always at the disposal of the field commander at any hour of the day or night, and takes orders from no one else. Hundreds of moving picture operators have been enlisted in the great war on the German side alone.

The life of the camera man at the front is a





An amazing war picture taken before the gates of Przemysl

## “WAR STUFF”

very hard one. He may be held for days awaiting orders in the field, perhaps under most uncomfortable conditions, ready at any moment to start on a dangerous detail. At daylight some morning he is probably directed to take moving pictures of a certain position on the battle field, a captured trench or deserted village where the doctors are still working among the dead and wounded. He may travel by special automobile or with an advance guard, or make his way on foot alone. The picture may be taken from the tottering walls of some building or from the trenches themselves. Danger and exposure are all in the day's work.

During the famous Galician campaign a friend of the writer, an American camera man, A. K. Dawson, had a typical experience with the first line German troops. "I had spent ten days," he explained, "in traveling from the Carpathians to join the forces bombarding Przemyśl. My army pass permitted me to ride on any means of conveyance as long as there was room. Sometimes I traveled by train, and at other times on the government automobiles rushing towards the front, but most of the distance was covered tediously in army wagons. My tent was finally

## THE CAMERA MAN

pitched with the artillery shelling Przemyśl. It was hardly a tent but rather a very crude shelter made with barrel hoops covered with blankets, but it kept the worst of the weather off for a couple of weeks.

"The range was about four miles so that our camp was continuously under fire. I was able to make moving pictures of the men bringing up the great siege guns, the work of setting them up, and the actual bombardment. In this bombardment the work is done mainly by the great siege guns, and the infantry is brought up later to clean up. Some of the guns were only a few feet from my tent and the shock of the reports was deafening. Like all the soldiers, I had to go about with my ears stuffed with cotton. This lasted for days until the forts of Przemyśl fell and we rushed forward to find that the great fortifications of steel and solid masonry had been turned upside down by the bombardment."

Many films are exposed with the bullets literally flying about the camera man's head. It is a common experience for the cameras to be shot away or smashed by the impact of an exploding shell. Several of the operators have fallen beside their instruments, and a number



## **"WAR STUFF"**

have been decorated for conspicuous bravery.

One of the most realistic "close ups" of the results of shell fire which has come to the writer's attention shows an unfortunate French soldier at the moment he was shot. The camera was operated from behind the wall of a dismantled house which afforded partial protection for the operator. The film shows several men in a trench and firing steadily, when a stray bullet strikes one of them in the head. The soldier starts with the shock, and then slowly relaxing his hold on his rifle falls back and his eyes close. A companion several feet away crawls to him, administers first aid as best he can and then, taking him in his arms and boldly exposing himself to the enemy's fire, carries him away.

Among the millions of photographs taken during the war no type, it is safe to say, entails more danger than those showing the actual effect of shell fire. As the photographer must almost of necessity work under fire, to be within range, any of his pictures may very well be his last. To snap a single shot and run would be dangerous enough, but the motion picture operator must hold his position, often with shells bursting about him, adjust his camera, and

## THE CAMERA MAN

grind his film patiently until the scene has been completed. One of the official movie men with the Austrian forces in Poland found himself one day unexpectedly in a position to make some very remarkable films of this kind. He was taking an Austrian artillery regiment bombarding a Russian fort some six miles distant. The aiming and firing was done by telephone direction, and the men imagined themselves entirely out of range. Without warning, the Russians suddenly got their range with remarkable accuracy and began dropping highly explosive shells about them.

The gunners nevertheless stuck pluckily to their guns, and the movie man stuck no less bravely to his camera. When a shell struck within range of his lens, he swung his camera in position and turned the crank. His films show great masses of earth, many tons of it, leaping into the air, in some cases to a height of fully one hundred and fifty feet, and then gradually falling back. So close were many of these shots that the camera man was sprinkled with the falling earth.

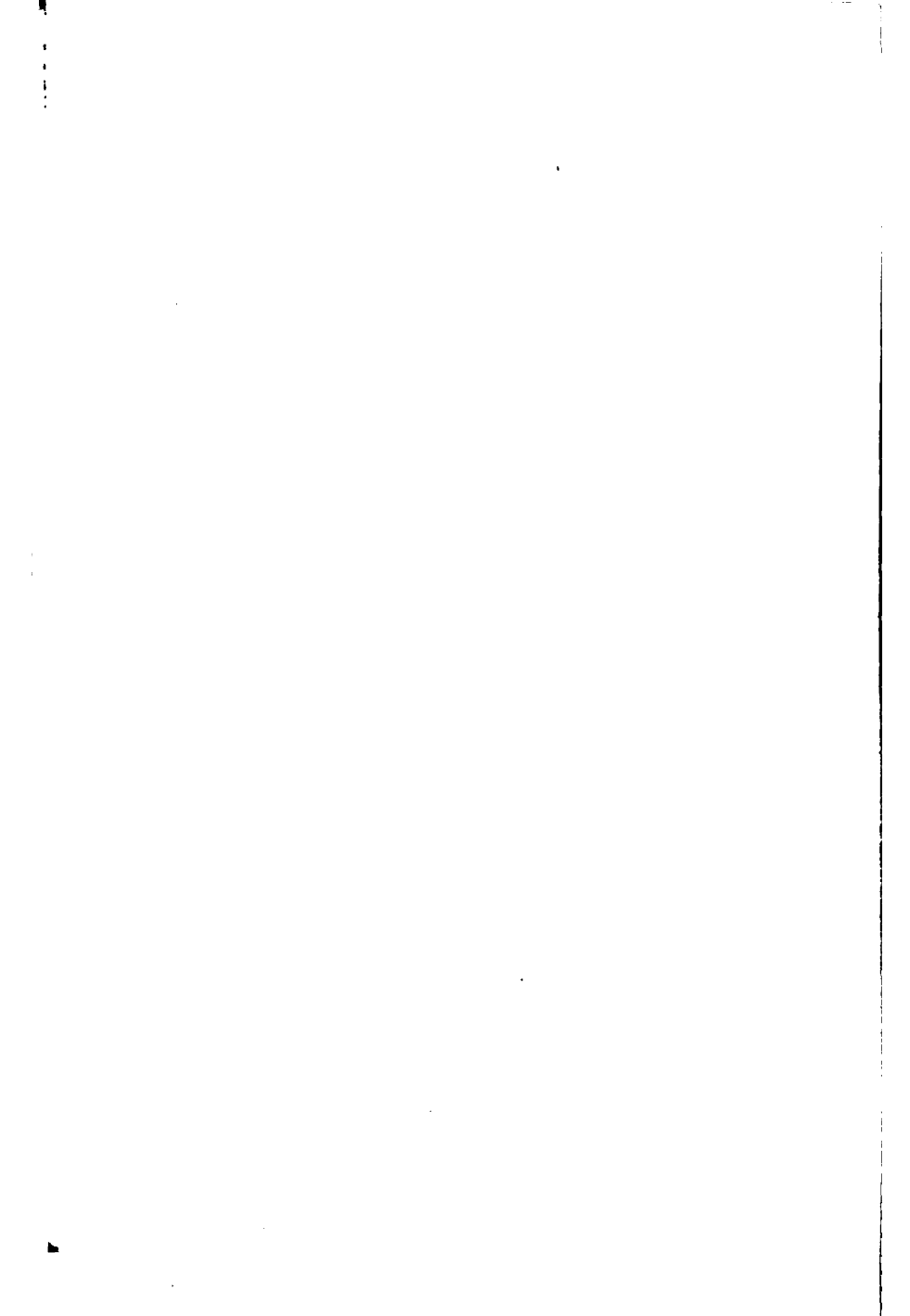
The focus was so sharp that the films at times show the dismembered bodies of the gunners hurled into the air. In one film the picture



An American camera man (A. K. Dawson) in camp before Przemyśl



First photograph made by Mr. Dawson of Fort No. 10 after the fall of Przemyśl



## "WAR STUFF"

is actually shaken by the explosion which occurred less than one hundred feet away. The firing became so rapid that the earth may be seen rising like giant geysers in rapid succession, the dirt spouting from one shot before that of another had fallen to the ground.

One of the most harrowing experiences of the camera man at the front has been his work among the ruined villages and the stricken refugees. The vicinity of burning houses which are under fire is dangerous enough in itself, but all this is forgotten in the distressing sights among the homeless and suffering people. A moving-picture operator who was with the German forces in the advance through Poland told the writer that the women and children crowded about his camera, begging him to protect them from the shells which were falling about them, until he could stand their entreaties no longer and asked permission to go to the rear. The film he took at the time shows the children wringing their hands and weeping or catching and kissing his hand as they begged him to protect them.

The presence of a moving-picture camera in a front line trench "somewhere in France" was once the cause of a serious engagement. The

## THE CAMERA MAN

two armies had dug themselves into trenches, and lay little more than a hundred yards apart. All had been quiet for days and the movie man had ventured into a German trench where he secured some interesting films. The watchful enemy noticed that something unusual was going on, and jumped to the conclusion that a new gun was being mounted or some important strategic move was about to be carried out. An advance was ordered, and the French and English troops in great force charged the German position, resulting in a serious loss of ground and of men.

Many remarkable pictures have been secured of actual fighting from a distance, but anything like a "close up," as it is called, of real action is of course very difficult to secure. Some of the best pictures have been caught by accident. A camera man, anticipating a charge of his regiment, once ventured well out from the safety zone, and planted his camera in the lee of a heavy stone wall. After several hours of waiting the advance came, and the movie man caught an amazing "close up" of the men as they rushed past with bayonets fixed and tensely set faces. Before the camera man could find his way back to his own lines, how-

## “WAR STUFF”

ever, there was a rapid retreat, the enemy found the range, and dropped shells all about them. The wall suddenly crumbled and brick and dust rained about him. It was a nervous moment. Grasping his camera the photographer outran the soldiers in the retreat and escaped in safety.

A large proportion of the pictures made in the European War are not intended for public exhibition. A rigid censorship is exercised over all photographic work by the governments, exactly as in the case of the mails and printed matter. The films may be developed in the fields or in near-by cities, but they are not permitted to leave the country until they have been passed upon. A board of censors sits in a darkened room at headquarters and scans every detail of the movies as they flash past. Should some secret, valuable in any way to the army, be revealed, it is debated or the film is destroyed.

The presence of the moving-picture men in such numbers at the front does not mean that the governments are going into the show business. The photographs thus secured, at enormous expense, become matters of official record and are obviously invaluable. In no previ-

## THE CAMERA MAN

ous war has such complete photographic reproduction been possible, and the government officials have been quick to take advantage of the opportunity. It is estimated that upwards of ten thousand films have been prepared by the army movie men in Germany alone. The Government is looking far into the future. Some of these pictures find their way into the theaters of Germany and are shown in foreign countries, but they are intended mainly for educational work in the military training schools throughout Germany when the war is over.

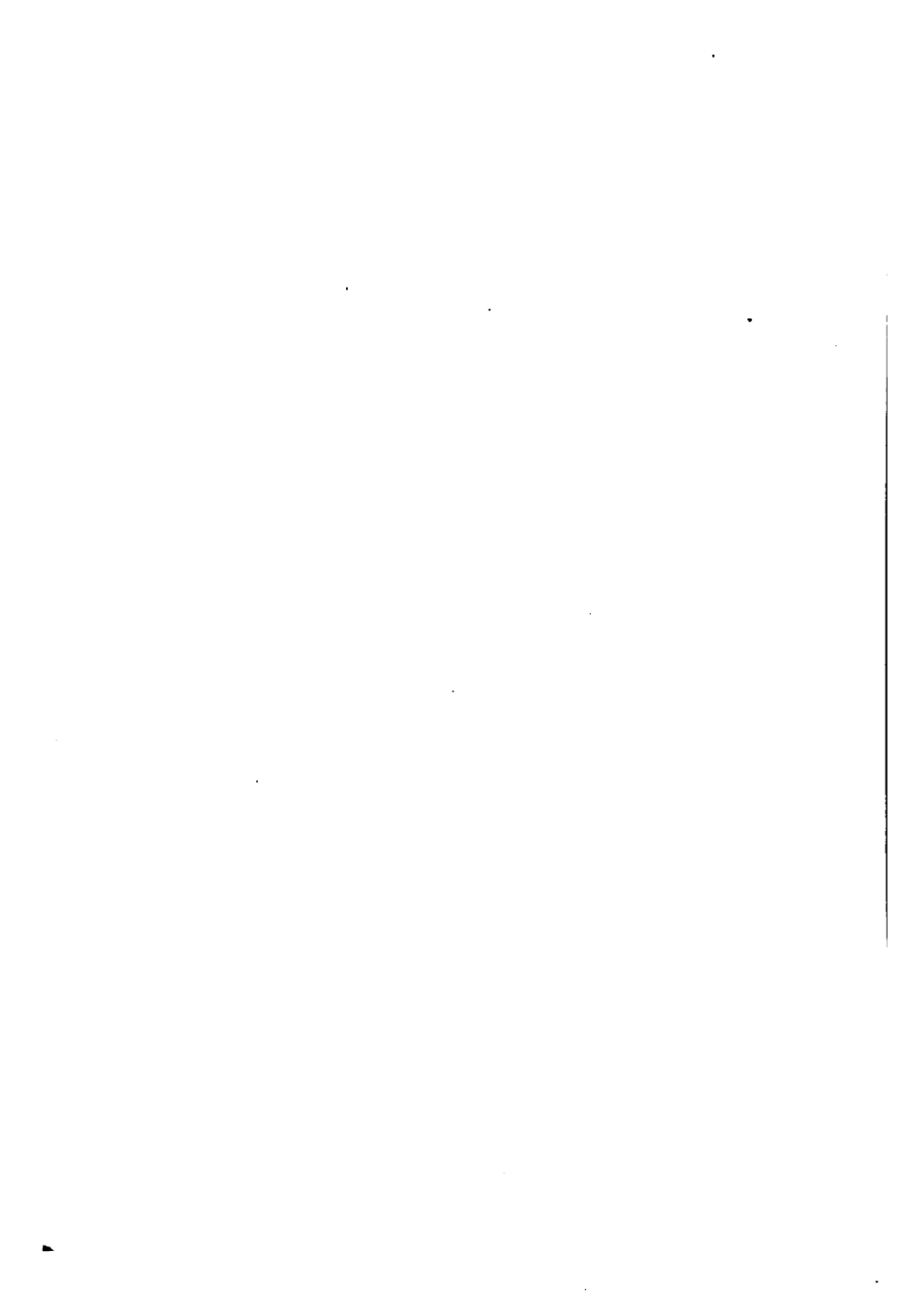
As illustration for text books and lectures, the war movies will have a unique value in the classroom. A lesson in strategy, for instance, may be illustrated by a moving picture showing the advance or retreat of troops in an actual engagement. Every phase of military instruction may thus be illustrated. The motion pictures showing the construction of bridges will help to train still more efficient engineers in the future than in the past. A careful study of their value will make the great expense of securing these war pictures seem trifling.

A remarkable feat in bridge building was caught by one of the official German movie men with their troops in the advance in Poland.





A very daring photograph taken during the bombardment of a  
French town



## "WAR STUFF"

Following their usual custom, the Russians in their retreat destroyed the bridges in order to hinder the advance of the enemy. The photographer was with the advance guard when they came upon a deep ravine, perhaps a hundred feet in width. He planted his camera in range, reeled off a few feet of film to show the interrupted road, and waited results. He had not long to wait.

In a few minutes the bridge-building corps was rushed forward in automobiles with its tools and materials. The next film shows the men attacking the problem with feverish energy. Beams and planks, all prepared in advance for such an emergency, are lifted from the automobile trucks and the bridge takes form, before one's eyes. It rises rapidly, heavy flooring is soon in place, and the cavalry are dashing across in exactly eighteen minutes.

Careful photographic studies have, of course, been made of the action of submarines under all conditions. A motion-camera man who had done a great deal of this work described his experiences to the writer as a film, taken by his assistant from a boat near by, was reeled off before us. The hideous undersea craft was shown afloat with her crew busy on

## THE CAMERA MAN

her narrow deck. A launch approached and the camera man with his apparatus came alongside and stepped aboard.

"See how quickly we went under?" said the camera man. "There we are going below. The last man, you see, unships the wheel and carries it along with him. Everything else on deck is waterproof. I found it pretty close quarters in the cabin. Even the wireless operator must work standing up with his apparatus upright against the side of the cabin. Room had been found, though, for a phonograph."

The submarine darted forward in the picture while the water rose rapidly. In a few seconds the narrow deck was awash and still she sank. It was an uncanny sight to see the craft with her human freight steadily sinking. As the waters closed over her, several puffs of spray rose in jets.

"There she blows," explained the camera man. "Looks like a whale, does n't she? That's the air escaping. Now only the periscope shows. I was looking through it and saw the camera taking this picture. And there comes a steamer. See, our periscope is within thirty feet of her. The rest of the film shows us rising. You see the V-shaped waves made

## "WAR STUFF"

by the periscope cutting through the water? There she comes." In a moment water fell away from her decks and the camera man was waving his hand from his deck.

Since the beginning of the great European War many patents have been sought for devices for utilizing photography in military operations. One of the most promising of these is the animated target. There have been perhaps a score of inventions for using the moving pictures to improve the aim of soldiers. One of these suggests a target consisting of a roll of white paper which unfolds as a picture is projected upon it. The moving picture may be a charge of cavalry. The soldier fires at the picture and the hole in the paper target indicates how true has been his aim.

Another inventor had devised a mechanism which instantly arrests the film when the shot strikes the target, while a bright light shines through the bullet hole. The accuracy of the shot is thus apparent. A special film was prepared of a soldier rising and firing from behind a breastwork. The marksman attempts to hit the soldier before he dodges behind the shelter. The mechanism is ingenious. The sound of the shot acts upon a microphone, which auto-

## THE CAMERA MAN

matically stops the film. These targets are very realistic. The pictures of soldiers or horses can, of course, be projected life size.

## CHAPTER II

### MEXICAN ADVENTURES

**D**URING one of the Villa campaigns in Mexico, a camera man had the unique distinction of acting as a commanding officer. It was all very real warfare, as the deplorable lists of dead and wounded testify, but the camera man nevertheless often directed the battles much as though he were working in a studio. A large moving picture company entered into a definite contract with Villa to make motion pictures of the campaign to be exhibited later in all parts of the world.

In return for a large sum of money Villa agreed, among other things, that the fighting should always occur between the hours of nine A. M. and four P. M., when the light would best suit the camera man. There were to be no night attacks, because they could not be photographed. And, despite many temptations to fight when light for photographing was poor, Villa kept his word. More than once during

## THE CAMERA MAN

the drive southward, the hour of four, when the photographer quit work, found the troops in a perilous position.

According to all the rules of military strategy, the army should have advanced to follow up the advantage gained in the day's fighting. The council of war invariably included the camera man, however, who would insist that the drive be postponed until the next day when the light was right, and the battle would be planned accordingly.

In many cases the fighting was actually delayed to suit the movie man, as though the action were taking place on a stage. One day the machine guns had actually been placed in position to meet an expected charge. Mr. L. M. Burrud, the photographer, had set up his camera near by. His range was, of course, much less than that of the rapid fire guns. The situation was explained to Villa, who thereupon ordered his men not to fire on the advancing enemy until the camera man gave the signal. The men behind the guns actually stood the enemy's fire without returning it until the advancing troops were in camera range. Then, and not until then, Mr. Burrud began turning the crank of his machine. This was



## MEXICAN ADVENTURES

the signal anxiously awaited, and a moment later the rapid-fire guns delivered a continuous deadly volley and the charge was checked.

One of the most spirited pictures brought back by Burrud from the Mexican campaign is a "close up" of a desperate charge down a city street. Several soldiers are shown running with fixed bayonets directly towards the camera—one is actually falling forward—and so close to the camera that the strained expression of their faces is vividly shown. The smoke of battle still hovers above their heads. To catch such a picture, the camera man must have been in the thick of the fighting.

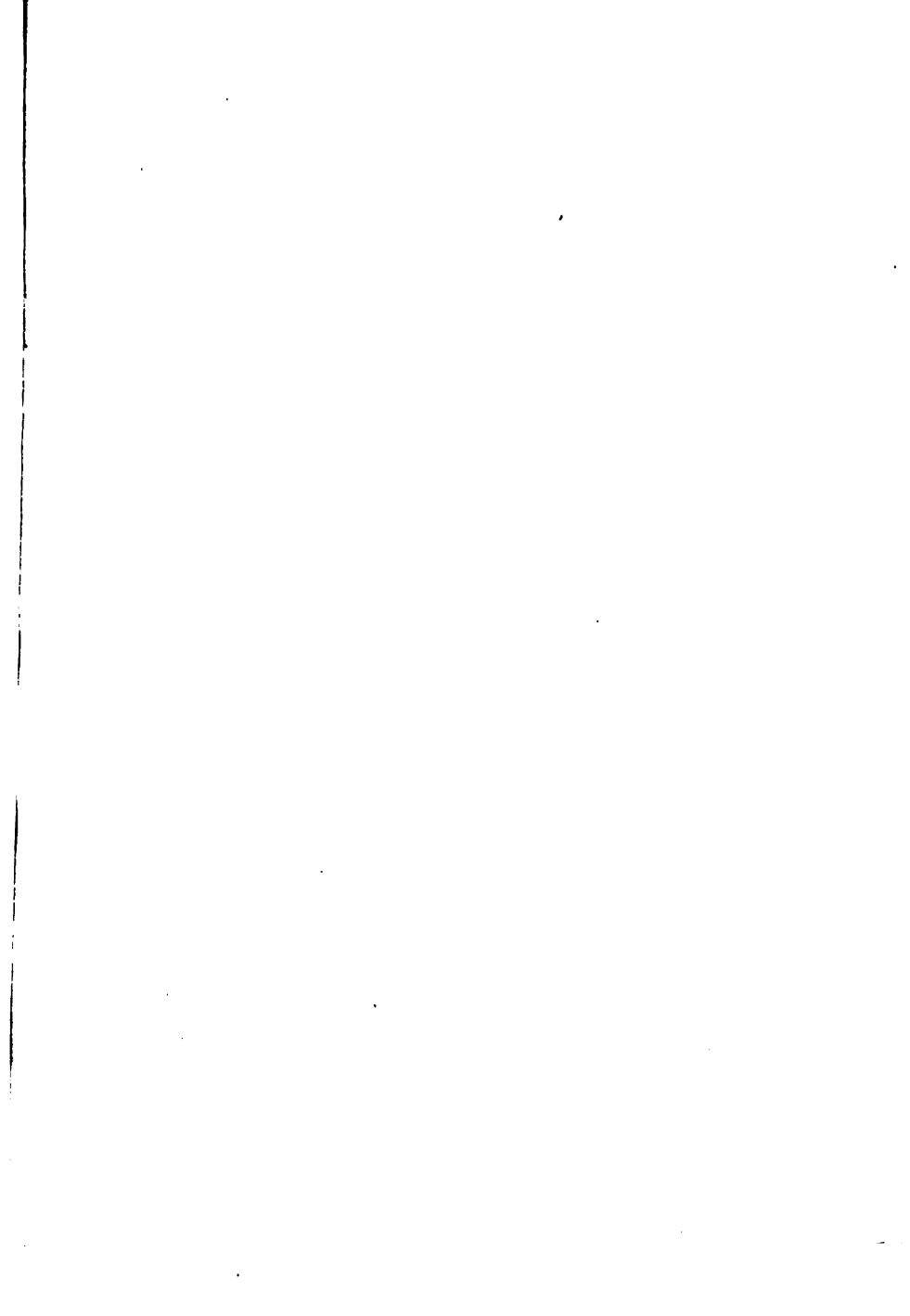
"A 'close up' like that," Burrud explained to the writer, "could scarcely be planned. The most daring photographer would not venture so far in. I happened to be down the street with my camera set up in the shelter of a wall when the charge came. It was too good to miss. When I saw them coming, I swung my camera around, and it happened that I could operate it while only one arm was exposed to a chance shot. I took that chance. Several shots whistled past and two men actually fell within good camera range."

The camera man at the front is usually well

## THE CAMERA MAN

paid. It is common for him to receive one hundred and fifty dollars or two hundred dollars a week, and of course all expenses, but surely he earns every cent of it. He must not only show himself fearless in very daunting situations, but must be a good photographer and chemist as well.

The light in the Mexican work, for instance, often plays curious pranks on the camera man. The glare of the tropical sun on the alkali deserts has new and unsuspected values. What might appear a trifling miscalculation in judging the exposure may endanger the work of weeks. One of the camera men in the Mexican campaign is the inventor of an ingenious light filter which is placed over the lens, which clears away the smoke and sharpens the picture as if by magic. He had observed that much of the smoke of battle which quickly settles down, blurring the picture, has a certain color quality which might be eliminated by filtering. In the picture, made through a selected screen, a bursting shell appears to throw out the usual cloud of smoke, but a moment later it begins to clear. The camera actually looks through these smoke clouds, while the human eye is blinded by them.





"Liquid Fire" used in the European War

## MEXICAN ADVENTURES

The camera man often enjoys the protection of a special guard which is detailed to protect him. Since the camera does not shoot so far as a gun, the photographer often works at a great disadvantage. The movie camera makes a conspicuous target and often draws the enemy's fire. The special camera guard, which originated in one of the early Villa campaigns, consists of two or more picked men who accompany the photographer or skirmish ahead of him, to render his position as safe as possible when the camera is set up.

Many thousands of feet of war film have been made while sharp shooters on both sides kept up a steady and effective fire. The guard protecting Burrud in much of his Mexican work consisted of two American Indians, both crack shots. The Indians' stealth and daring in reconnoitering the ground in advance often proved invaluable.

Every possible provision was made in those Mexican campaigns for the convenience of the motion-picture man. The provision or even the ammunition wagons might be delayed, but the photographer and his equipment was kept constantly at the front. Whenever the troops followed the line of a railroad, the camera man

## THE CAMERA MAN

was given a special car for his exclusive use. A fast automobile was assigned to him when the roads permitted, while in covering the mountain trails where one must often travel on horseback, he was always liberally supplied with fresh mounts.

It was found impracticable to develop the films in the field. A dark room was installed on the special Pullman, to be sure, but the water was usually bad. The movie man had to content himself with developing short sections of his films to test his exposure. The reels of exposed films were shipped back as expeditiously as possible to New York to be developed and printed for distribution.

Some of the most daring work ever attempted by a camera man was accomplished in this Mexican campaign. Villa and the Mexicans soon came to look on the photographers with suspicion, and the success of their work depended largely on gaining their good will and support. Burrud decided to make a grandstand play to win their respect. It was the season of the bull fights, when the toreadors were the heroes of the day. The moving-picture man secured permission to enter the bull ring, and one fine day, when thousands of

## MEXICAN ADVENTURES

Mexicans had gathered to enjoy a bull fight, he loaded his camera, swung it from a strap over his shoulder, and crossed the barrier.

The audacity of the feat won the Mexicans at once. For the trained bull fighter to face the dangers of the ring is sufficiently perilous. The photographer was handicapped by a heavy camera and, while a toreador may dance for a moment before the infuriated bull and jump nimbly aside, the movie man tried to get within short range of the animal and stand his ground long enough to grind out as much film as possible. These pictures were probably the most dangerous "close ups" ever attempted. Burrud remained in the ring long enough to take several hundred feet of film, and escaped with his life and his camera.

Once the bull, who seemed to object to posing for his picture, singled out the movie man from among the toreadors and charged him so fiercely that he was obliged to run for his life. As he vaulted the barrier at the side he felt the animal's hot breath on his neck. The feat caught the fancy of the crowd, which gave the camera man an ovation. Villa, who always attends such functions, was so delighted that he

## THE CAMERA MAN

gave an elaborate dinner the same evening in honor of the daring Burrud.

During the Villa fighting, Burrud was called outdoors unexpectedly at sunrise one morning and directed to report with his camera at once at headquarters. When he arrived, coatless and breakfastless before Villa's tent, he was told that the General had decided to have some twenty prisoners shot and wanted a moving picture made of the execution. The prisoners, most of them political merely, were to be butchered to make a moving-picture scene.

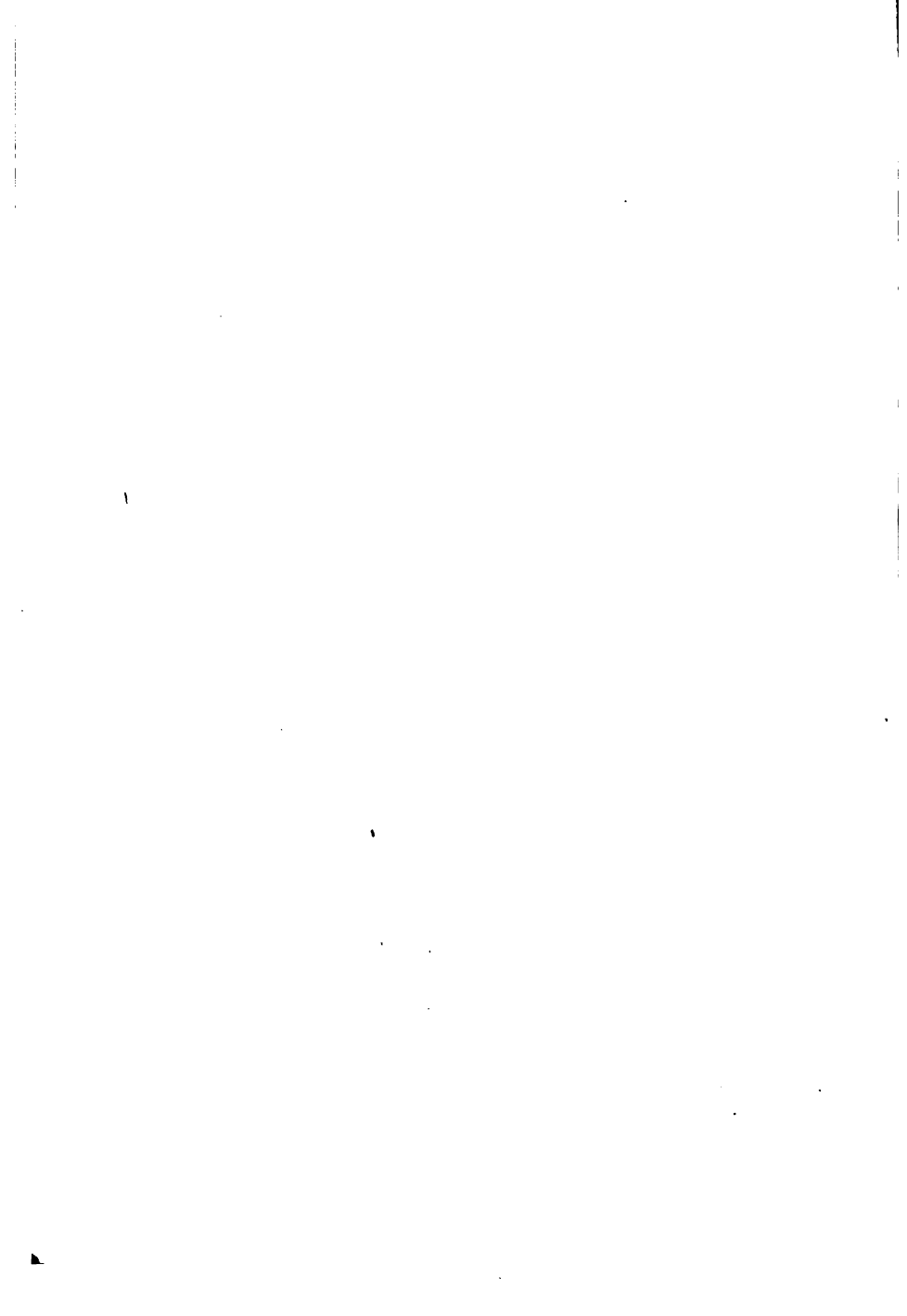
Burrud feigned to examine his camera closely, and then explained to the General that his films were bad and it would be impossible to take the picture until a new supply arrived. Villa was disgusted to miss the entertainment, but the camera man insisted that there was no use in making the exposure, and the picture and the execution were put off for several days. By the time the next supply of films arrived, the General had fortunately changed his mind and the men were saved.

In the end Burrud fell from Villa's good graces and was forced to leave camp with great abruptness. In addition to photographing the actual fighting, he was called upon almost daily





A perilous close-up "somewhere in France"



## MEXICAN ADVENTURES

to make long films of Villa himself. Whenever there was a new horse or a new uniform, he was ordered out before breakfast to record the fact in deathless films. The General's passion for being photographed became an obsession. Villa must have his "moving movie" before breakfast every day, and the camera man began to tire of the exercise. One morning, when the excuse for being photographed seemed particularly trivial, Burrud went through the motion of focusing and exposing without loading his camera. At the end of the scene he turned to his assistant.

"I fooled the old peacock that time," he said; "the camera's empty."

By a surprising piece of ill luck a Mexican standing near by, who understood English, overheard the remark and at once repeated it to Villa. The camera man was summoned to headquarters at once. The General was furious. Burrud was told to pack up and go home without a moment's delay.

"And if you were not an American," Villa shouted at him, "I would have had you stood up against the nearest wall and shot."

By a curious chance Burrud, who had served with Villa's army on several expeditions, ac-

## THE CAMERA MAN

accompanied the American punitive expedition under General Pershing when it was suddenly ordered across the border in pursuit of the bandit and his followers. Knowing the Mexican situation and Villa's character as he did, Burrud had scented danger in advance and kept within striking distance of the border. On the first news of Villa's raid he arranged for an automobile and a large supply of film, and held himself in readiness for orders.

Despite the remarkable speed with which the United States cavalry pursued Villa, Burrud secured thousands of feet of film of the advancing column. This was rushed back by special couriers, and in an amazingly short time as much of it as passed the censors was being displayed on screens throughout the country.

When it was reported that Villa had been killed, the army officers selected Burrud to visit Chihuahua and identify his body. No one else was so well prepared to decide this vital question. Burrud had focused Villa's face in hundreds of "close up," and ground many thousands of feet of film through his camera in his presence. Accompanied by several Mexican officers, who acted as a bodyguard, and of

## MEXICAN ADVENTURES

course carrying his camera, Burrud visited Chihuahua.

The appearance of the American photographer and his camera started a violent demonstration. He was pelted with decayed vegetables and other missiles, and hooted through the streets. One of his party had an ankle badly injured by a flying stone. All is grist, however, that comes before a motion-picture camera, and Burrud improved the perilous opportunity by securing some very spirited scenes, barely escaping from the mob with his life and his films. As all the world knows, he was able to decide that the dead man was not Villa.

## CHAPTER III

### AERO-PHOTOGRAPHY

**I**N modern warfare the man behind the camera, often in the face of appalling danger, renders perhaps a greater service than the man behind the gun. The keen eye of the camera is never blinded by excitement and its observations are unprejudiced and exact. The camera scout is recognized as a major factor in conducting warfare and has come to be almost indispensable.

Nowhere has the camera man proved himself so essential as in aëroplane scouting. From his vantage point, often directly above the enemy, little remains concealed. His camera looks into the fortifications and trenches, he spies upon the position of the troops and locates concealed batteries. Such photographs keep a commander informed of the exact position of his own and the enemies' troops, outposts and cavalry along the entire



(c) Brown & Dawson

An aero camera man at work





## AERO-PHOTOGRAPHY

battle line, and prevent unexpected blows, thus practically eliminating the element of surprise.

The work of the aëro-photograph at the front has been carefully organized. As a rule the camera man who goes aloft in the aëroplane service is a volunteer, for the work is extra hazardous. In the German army the age limit is fixed at twenty-eight years. The percentage of deaths in ordinary aëroplane scouting is very large. Even when flying under the most favorable conditions accidents are alarmingly common and a fall is usually fatal. The camera man in the aëroplane, in order to get his focus, must usually work within range of the firing lines. Few precautions are possible. The bottom of the aëroplane may be covered with metal sheets, when it is said to be armored, but the pilot must depend upon his fleetness and elevation to dodge the enemies' fire. There is besides the chance of encountering another aërial craft, probably armed for an attack with a machine gun. Calmly facing such dangers the camera man must coolly adjust his camera, calculate the value of light and shadow, the speed of his craft and altitude, and make his exposures at just the right instant. The photographer who loads his plate-

## THE CAMERA MAN

holders and, camera in hand, takes his place on a scouting aëroplane faces perhaps a greater hazard than any man of his profession, which is saying a great deal.

Each aëroplane squadron on a war footing comprises as a rule six machines, besides two reserves. Of these two regulate the cannon fire, two are used for aërial combat, and two for reconnoitering. Each of the reconnoitering machines is especially equipped for photographic work. On some the apparatus may be utilized at 2000 meters altitude, while others may be employed up to 3500 meters.

The army officials naturally guard with the greatest secrecy the results of aërial photography. It has been comparatively common, however, for the aëroplanes of both armies to be brought down, while many have been obliged to land within the enemies' lines. In this way it has been learned that the entire battle line in France and Belgium has been systematically photographed from aëroplanes by both sides. The difficulties of this work have been enormous. Since the line has been hundreds of miles in length it has been necessary to take thousands of photographs. These pictures are in turn developed, printed,

## AERO-PHOTOGRAPHY

- and classified, until they form a continuous panorama of absorbing interest. Thousands of aëroplane flights have been made in securing them, and no one knows how many brave men have been sacrificed in the work.

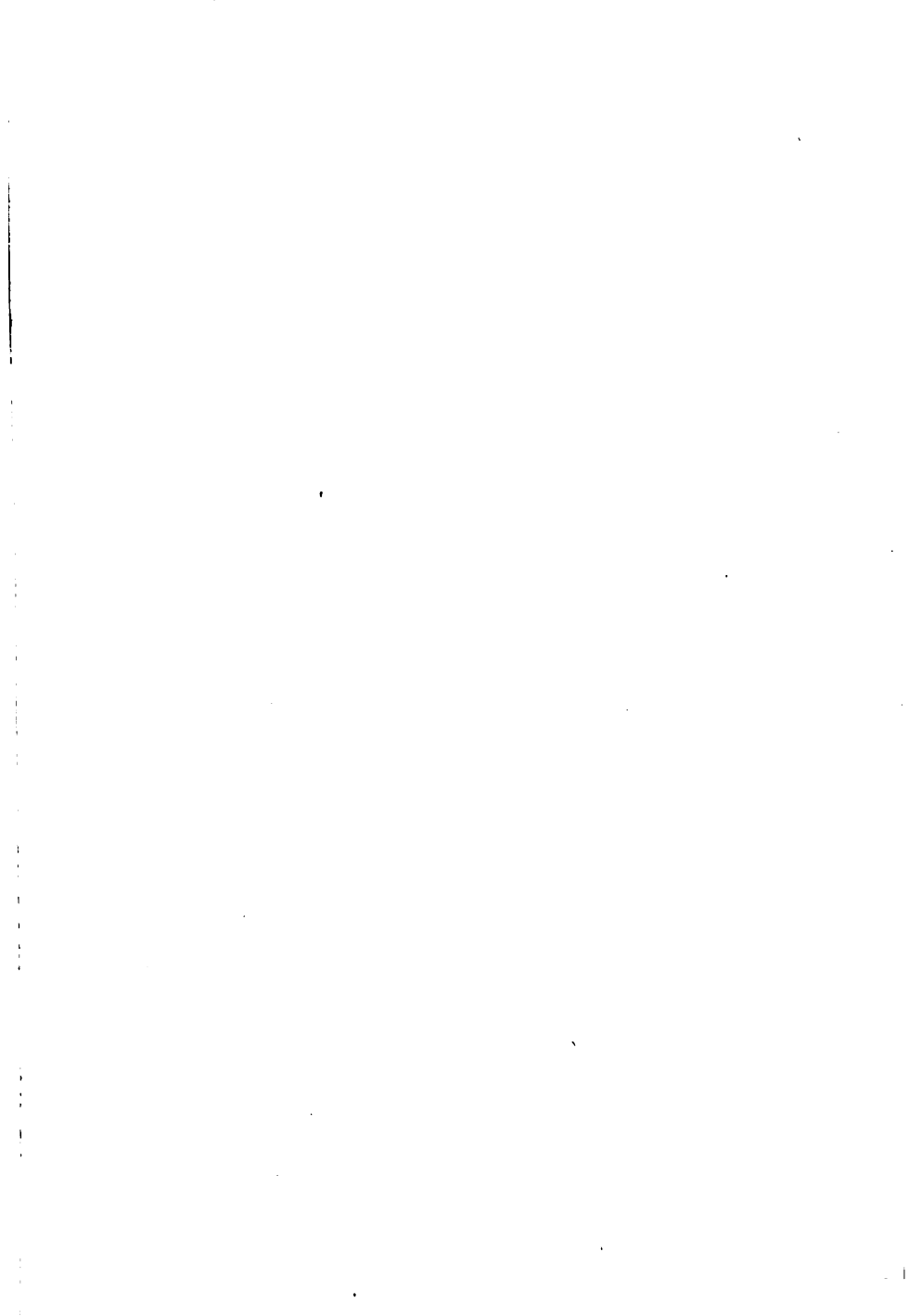
In point of daring what exploit can match the flight of the camera man who accompanied an air scout to locate the fortifications about Venice? The marvelous film of the flight was explained in detail to the writer by the photographer, a captain in the Austrian army, as it flashed past. The camera man was shown first installing his moving picture machine aboard a hydro-aëroplane "somewhere" near Trieste. At the last moment several bombs were taken aboard having a total weight of about three thousand pounds. The machine lightly skimmed the water and rose, rapidly diminishing in size as it sped across the Adriatic Sea. On approaching Venice the aëroplane became the target for six batteries. A motion picture taken from a vessel at sea clearly showed the airship at a great altitude sailing through what appeared to be sky dotted with small white clouds. The Captain explained that these were puffs of smoke produced by bursting shrapnel from the attacking batteries. By a miracle

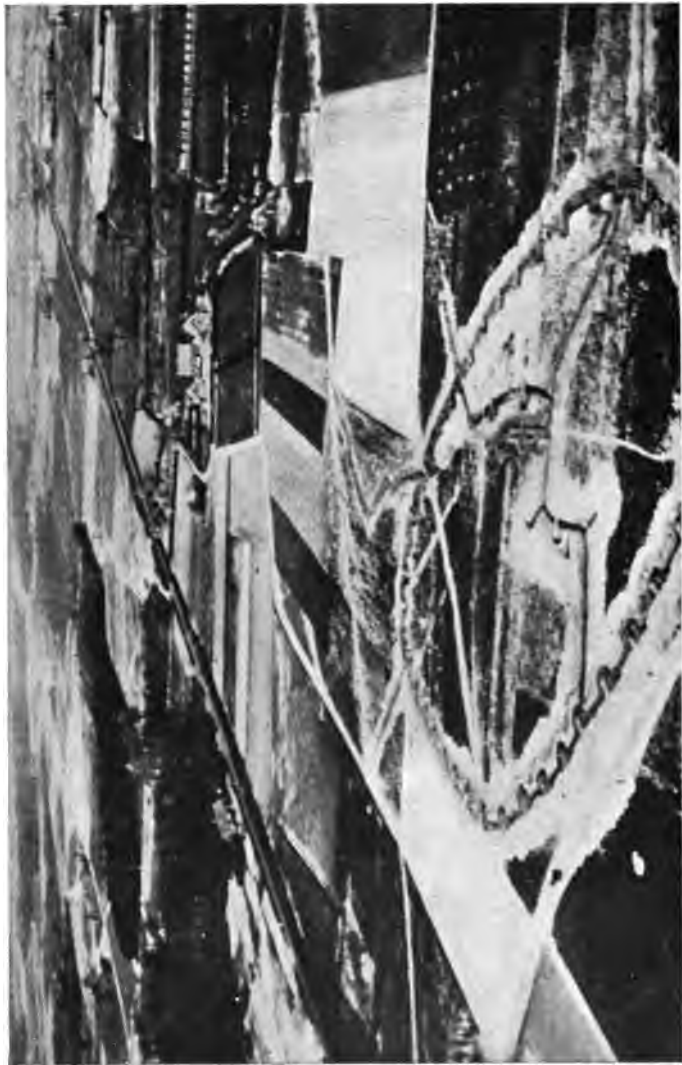
## THE CAMERA MAN

of luck the aëroplane was not seriously damaged in this rain of metal and the photographer calmly turned the crank of his camera not knowing what instant a fatal shot might come.

The flight was continued until after nightfall in order to draw the enemy's fire, so that the position of the batteries, indicated by the flashes of flame, might be located and mapped. The aëro pilot and the camera man deliberately exposed themselves to continual firing for fully an hour in order to complete the military map.

No ordinary camera would serve the aëroplane photographer. The aëro picture must be taken at top speed, or in something like one thousandth of a second, and the camera must be small and light enough to be handled readily. With the air craft flying a mile a minute or better, there is no time for adjusting a complicated apparatus. When traveling at high speed the force of the air will sometimes wrench the camera from the hand. The German photographers in the field work have used a special camera equipped with a pistol grip, and handle their cameras as they would a gun. The exposure is made by pressing a trigger which controls the shutter. Such a





Trenches "somewhere in France" photographed by a German aero camera man

## AERO-PHOTOGRAPHY

camera can be instantly aimed at any object and "discharged" with a single movement of the hand.

These cameras are equipped with lenses which see more clearly than the human eye, and record every possible detail over miles of country, even though they wink in a thousandth of a second. The telephoto camera, which has been especially designed and constructed for aëroplane work, is as powerful as a small telescope or the field glasses available for an army officer.

Every one who has ever looked at the ground glass of a camera beneath the focusing cloth knows how the world suddenly appears in miniature. As one looks through the telephoto camera the landscape suddenly leaps nearer like the stage of the theater through one's opera glasses.

With such a camera excellent photographs may be taken at a height of 3500 meters or rather more than two miles. From such altitudes the lens sweeps a broad expanse of country. In the photographs made from a point a thousand feet or more up the detail recorded is often marvelous. A fort or a trench is thus shown as clearly as though snapped by an ordi-

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nary camera at a distance of but a few feet. Many of the pictures are taken at high altitudes with the camera inverted and the lens pointed through a hole in the floor of the car.

Since these flyers can work in a radius of 100 miles, their operating base need not be near the battle line and the dark room problem is greatly simplified. When he has returned to earth with his exposures, the developing and printing may be done in some near-by city or town. It is often necessary, however, to develop in the field, when special portable tent dark rooms are employed, or the films are developed in special trays without the use of ruby light. Developing becomes a thrilling operation when a chance bullet or bursting shell may at any instant enter one's dark room and fog the plates, if it does nothing worse.

With these aëro photographs before him the modern commander may be said to look directly down upon the battle field. An attack or a defensive movement may be planned like a game of chess, where every square of the board is beneath the eyes. The value of these aëro views is greatly increased by combining them with the regular military staff maps. An expert mapmaker traces upon these photographs



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the various boundary lines, accentuates the roads and other lines of communication, and indicates the towns and villages with their population, and even the buildings which may be of service.

An amazing amount of information concerning the country is indicated by an ingenious cypher. Without defacing the photograph the draughtsman adds many mysterious crosses, circles and other marks, which the military expert can read at a glance. This cypher indicates, for instance, the presence of railroads, whether single or double track, the locations of all bridges and indicates their material, the presence of telegraph or telephone lines, the location of a valley or a hill and their exact grade. Every road is marked and its width is indicated. If there be a church or any high object which might be used for purposes of observation it is set down; in short, all possible information which could be of use to the strategist is indicated.

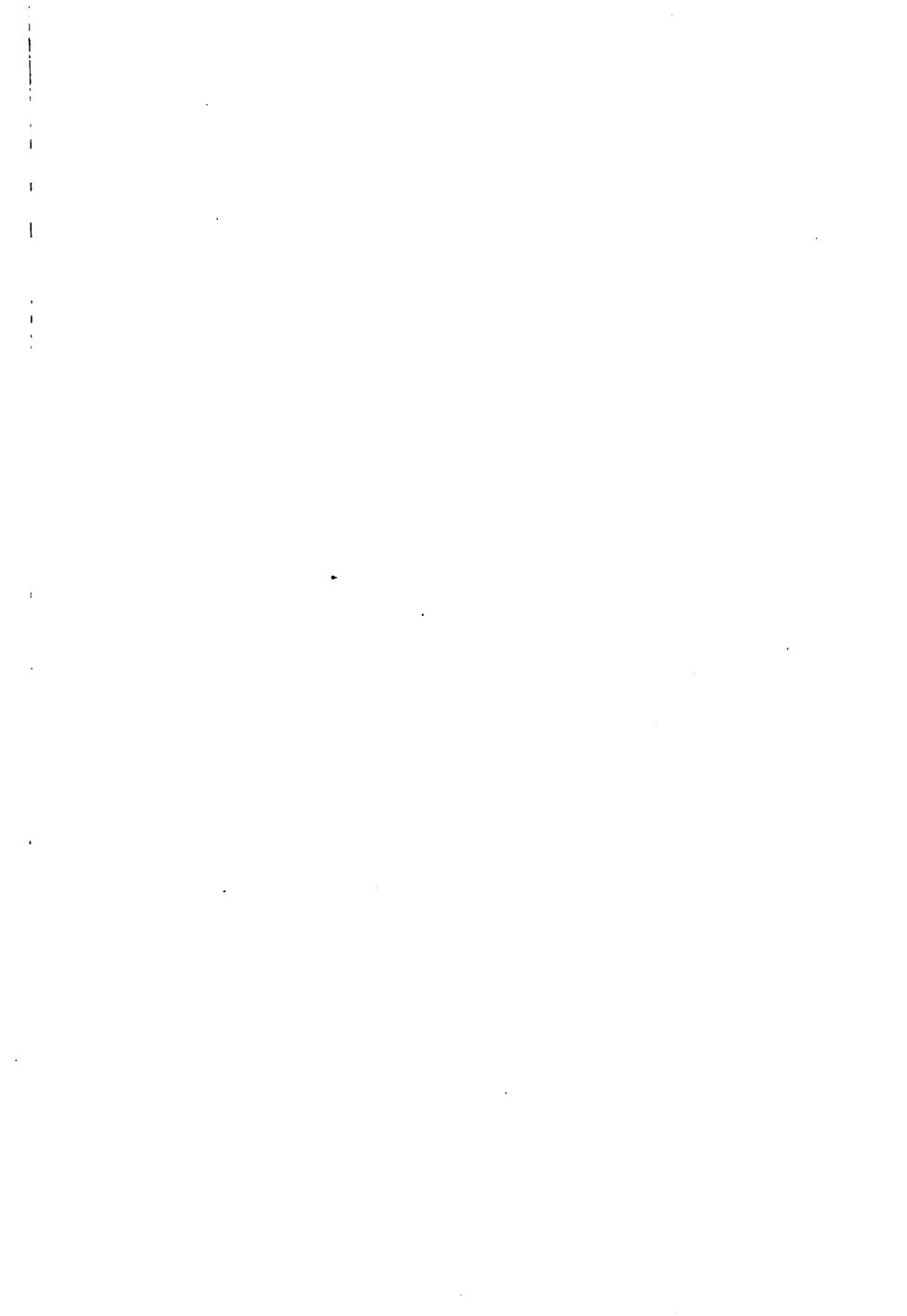
The aëroplane, and especially the telephoto camera, has been freely used in the Signal Service of the United States army. In artillery practice where the range exceeds one mile it is customary to make actual photographs of

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the effect of shell fire. When the observations are made by the eye, even aided by powerful field glasses, opinions are likely to differ. The telephoto camera settles all disputes and makes every detail a matter of definite record. A shell may be actually photographed in the air or at the moment of the explosion, even when the practice is for long ranges. The present accuracy of the American artillery fire is due in part to the assistance of the camera man in the field.

The camera man had successfully added the aëroplane to his photographic outfit before the war. The first regular commercial photographs of this kind were probably those made in America, where they met with instant success. A great many chance snapshots had been made from balloons and aëroplanes in the past, but it remained for an ingenious American to realize that the flying craft would give his camera an entirely new and unique point of view, and the pictures made in this way would be so valuable that the expense of securing them would be justified. A new field of photography was opened.

The early aëro views were made above the north shore of Long Island Sound, not far





(c) Brown & Dawson

Photograph from an aeroplane of the Long Island shore

## AERO-PHOTOGRAPHY

from New York City. The shore line at this region is famous for its beauty and its fine estates. Before the days of the aëroplane photographer the owners of such estates might have their homes photographed in the conventional way from one side or another, but it was impossible, of course, to secure a general view which would show every foot of the shore line, the lawns, terraces, and gardens. From the aëroplane, however, a fascinating view is caught of the entire estate from a wholly new view point. Families which had occupied these beautiful homes for generations had never before realized their beauty. The aëroplane photographs proved to be a great success.

New and unexpected use was quickly found for aëroplane photography. It proved effective, for instance, in advertising new real estate enterprises. No matter how attractive may be the photographs of the houses on sale, or how clear the maps showing their grouping, it is impossible to present all this in a general picture. The aëro photograph shows the entire tract of land with the streets, houses, and foliage at a glance. The eye can instantly measure the distance of the houses from the

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roadway and trolley lines, and appreciate the attractions of the surrounding country.

These photographs were made from a high-powered hydro-aëroplane. The camera man's car rose from the surface of Long Island Sound and after the exposures had been made came to rest always without mishap. A regular telephoto camera was used, which was held in the hand. Most of the pictures were taken while traveling at a speed of over a mile a minute. The air craft rose at times to a height of one mile, although most of the pictures were made at an elevation between 1000 and 1500 feet.

The camera man may use either plates or films. In case of a fall it would not matter much which. The extra holders are kept in easy reach. The best elevation for the picture is decided upon in advance, and the pilot with an eye on his barometer climbs rapidly. The photographer, camera in hand, with shutter set, waits for the proper range. Once he has his altitude, the pilot darts ahead, for there is no halting on the wing.

A quick eye and a ready hand are required to make an exposure. Once a picture has been made of any particular object there is, of

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course, no time to reload the camera. The aëroplane will have traveled half a mile or more before the holder can be changed and the shutter set. To take a second snap from a given point the air craft must make a wide detour to turn upon its course and retrace its flight. In wind it is difficult to keep the craft on the same plane. A minute or more is required by the most skilful pilot to return to a given point.

After laboriously climbing to a fixed altitude the camera man may find himself too low or too high for a good picture. To change his elevation the aëroplane may be obliged to travel for several miles, while a contrary air current may knock him off his course.

"The great difficulty is the speed of the flight," an aëroplane photographer explained to the present writer. "You can have no idea how fast seventy-five miles an hour is until you see the landscape racing past the finder of your camera. First, I would estimate the best elevation for the picture and the pilot would bring his machine to it and pass the object I was to photograph. It would seem to leap towards me and we would flash past and be a half a mile on our way, it seemed, in no time.

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A surprising amount of distance must be covered to secure a single photograph. In the time required to change plate-holders, for instance, the car would travel a mile or more. It is impossible to check your car for the least instant. It is the liveliest kind of shooting on the wing with a difference. My best record was made under favorable weather conditions when I went up 1000 feet, made three exposures, and got safely back in six minutes." It usually takes much longer and in war scouting a flight may last for an hour or more.

The value of the aëroplane photograph, even apart from its use in warfare, seems to be assured. Since it makes it possible to photograph a house or building of any kind from a new view point, it is valuable both to the owner and the architect. Such pictures tell the whole truth about real estate enterprises. The landscape gardener finds these pictures invaluable in his work. The government officials have already considered the idea of using such pictures in connection with the Forestry Reserve. A very general application is promised, besides, in many branches of constructive engineering, such as the building of bridges, canals, and railroads.



## CHAPTER IV

### THE NEWS PHOTOGRAPHER

**P**EACE has its adventures for the camera man, no less than war. Let an accident occur in the most remote part of the city, at any hour of the day or night, and the news photographer will be on the scene as soon as the ambulance. He is among the first to respond to any fire. At any public function, in or out of doors, the click of a battery of cameras is a familiar, perhaps an irritating, sound. In the offices of the newspapers, and the news photographers, scores of alert camera men are held in readiness to start anywhere on a moment's notice.

News photography is usually the liveliest kind of rush work. Everything is done to save time in reaching the scene of the story. If the trains or street cars do not run directly to the spot, automobiles are employed to rush the camera man to the scene of the accident or whatever the news center may be. On reach-

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ing the scene, the photographer works at top speed. The goal of the race is, of course, to obtain a good photograph and reach the office with it in time for the next edition.

In order to save a few minutes of valuable time, a Philadelphia newspaper has provided a dark room on wheels, fully equipped for developing and printing. The dark room is constructed in the shape of a mammoth camera with bellows and a great dummy lens mounted on an automobile truck. An extension which may be raised above the roof enables the photographer to take his picture from a point thirty-five feet above the street level. In many cases this is a great advantage, since he may then look down upon street parades or accidents, or find himself on a level with burning buildings. The picture taken, the photographer retires into his perambulating dark room and develops and prints without loss of time, while the dark room is speeding back to the office. In this way he is likely to have his photograph ready to turn in as soon as he reaches his office.

From long practice the news photographer becomes remarkably ready and accurate in handling his camera. In photographing the

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finish of a race, the flight of an aëroplane, and scores of fleeting subjects, he rarely misses fire. A friend of the writer's was once assigned to photograph a five-story building which was expected momentarily to collapse. He took two cameras, both of course loaded. The street before the building was roped off and guarded in expectation of the fall. The camera man first made a picture of the building as it appeared, and then focused and loaded his cameras, set the shutters, and sat down to await developments. It was tiresome work, since he must be constantly alert, but he remained for six hours, camera in hand, ready for the critical moment. The building finally collapsed without warning, but the photographer was not caught napping. He managed to snap the camera he held in his hand, and catch up the second camera and make another exposure in the fraction of time the wall was falling. The pictures of the wall in its descent scored a "beat" on the other newspapers.

It has often been remarked that the photographers usually get to a railroad wreck before the doctors. The news of a serious wreck which occurred near Stamford reached an alert photographer a mile or more from the scene

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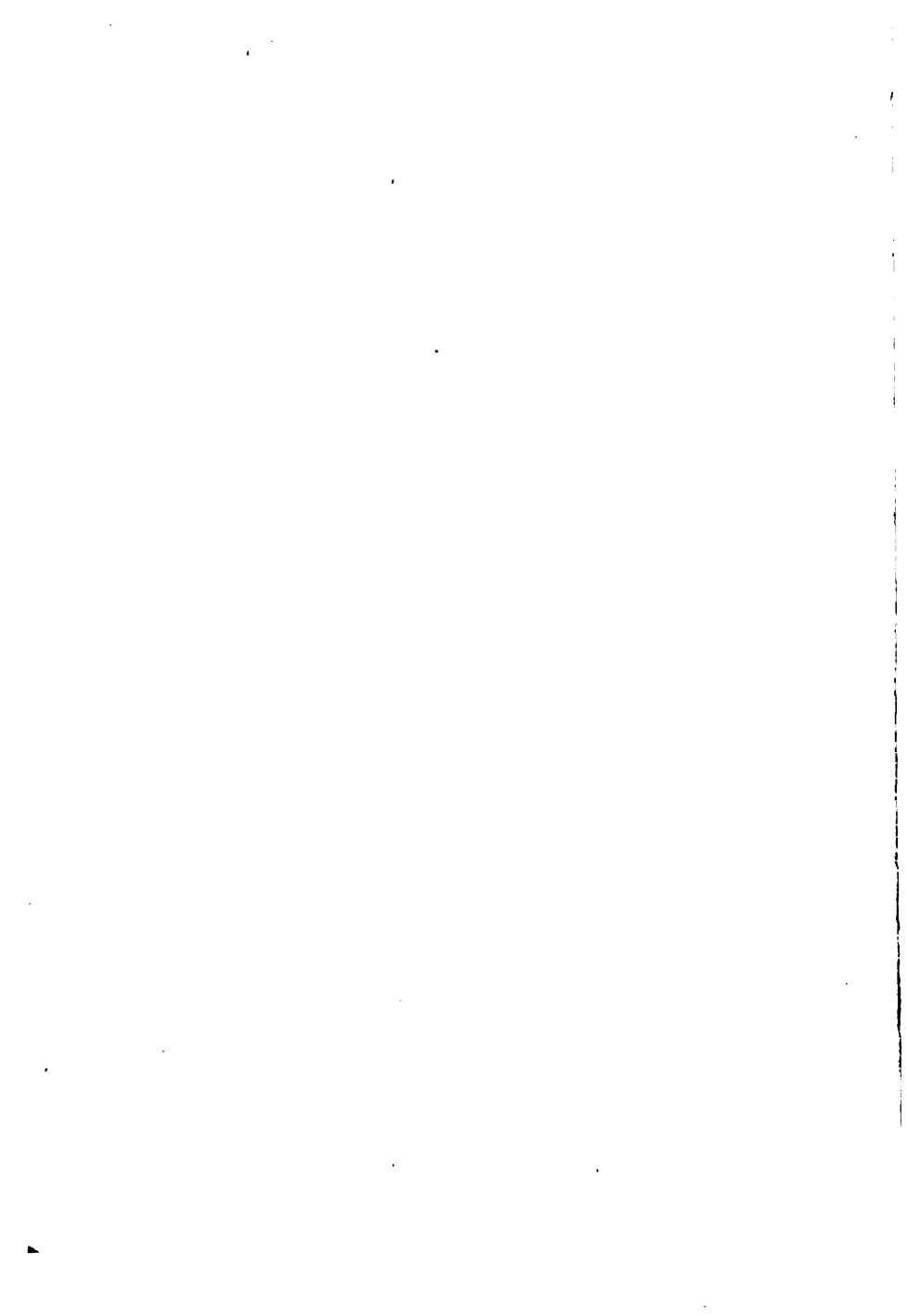
only a few seconds after the impact. Seizing a camera and commandeering a convenient automobile, the camera man started at top speed with the horn tooting a continuous warning. He reached the wreck in less than three minutes, and within the next four minutes had made five exposures from various points of view and was on his way back to the dark room. The pictures were developed, printed, and mailed, catching a train for New York in less than fifty minutes after the accident occurred.

The most remarkable "news picture" ever taken was probably that of the attempted assassination of Mayor Gaynor of New York. The attack, it will be recalled, was made on the deck of an ocean steamer. A news photographer had just asked the Mayor to pose for him, and the camera had been leveled and focused, when the shot was fired. The Mayor tottered for a moment and slowly fell backward. The police commissioner, who had stood beside the Mayor, grappled with his assailant. Despite the confusion, the photographer kept his head, and with his eye on the finder of his camera released his shutter. The Mayor was photographed as he fell and the camera man found time to change his plates and



(c) Brown & Dawson

An aero camera man rising from Long Island Sound



## THE NEWS PHOTOGRAPHER

make two more exposures within the next few seconds. The pictures, which were sharply focused, showed every detail of this distressing scene, even the expressions of the faces.

The resourcefulness of the camera man was well illustrated in a street car accident in Brooklyn recently. Two men had been caught in a collision of cars, and although severely crushed it was impossible for a moment or two to release them. A news photographer chanced to be in one of the cars, while on the other car was a man carrying a camera. The newspaper man commandeered the camera, put a plate in position, focused and adjusted the shutter by the time the two cars were pulled apart. His picture showed the injured men at the very moment they were released from the wreck.

The keenest rivalry ever known to secure news pictures, in New York at least, was the scramble for photographs of the ill-fated S.S. *Titanic*. The world was deeply moved by the tragedy, and the demand for actual pictures was correspondingly great. Aboard the S.S. *Carpathia*, which rescued the survivors and brought them to New York, there were of course several amateur photographers, and

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many pictures had been taken of the *Titanic* boats and the survivors. The *Carpathia* reached New York very late at night, and as she moved slowly up the Hudson River was photographed by the light of scores of blinding flashlights set off aboard the flotilla of boats which surrounded her. The scene was unique in the history of New York harbor. Every few seconds the great liner was illuminated from stem to stern by the flashes of this extraordinary bombardment.

Among the hundreds of newspaper men who boarded the *Carpathia* at her dock there was the keenest rivalry to secure pictures of the famous rescue. The pictures taken at sea had not been developed, and since they had been made by amateurs and under unusual conditions, it was probable that only a small percentage of them were of any value. The newspaper men must buy a "pig in a poke." On being developed the films might be found to contain nothing at all. So intense was the rivalry, however, that the newspapers competed against each other for these undeveloped films and bid up the little rolls to preposterous prices. Several rolls of films were bought for fifty dollars each, which on being developed



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with feverish haste were found to be worthless.

No cameras were allowed on the incoming steamer, or on the dock on that historic night, but the news photographers were not to be denied. The street facing this dock is unusually wide, and the newspapers several days before the ship's arrival rented rooms in the buildings directly opposite the entrance to the dock. These windows were manned by "long toms," or powerful telephoto cameras, which would take pictures at extreme range. When a group of the survivors would emerge from the entrance to the dock, at two or three o'clock in the morning, a flashlight would be set off in the street and the long distance cameras more than one hundred feet away would catch a fairly good picture. The undeveloped pictures purchased from the passengers in the small hours of the morning and the scenes caught by the "long toms" appeared in the newspapers which New York unfolded at its breakfast the same morning.

Without a word of warning, as is the way with news, down-town New York was suddenly shaken several years ago by a deafening explosion. The roof of a large storehouse con-

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taining chemicals was broken, and sheets of tin and other debris soared a thousand feet in the air. Some newspaper men who chanced to be on an upper floor of a towering building nearby, following a common impulse, sprang to their feet and started for the doors. One of them was a photographer, however, who first snatched a camera, rushed to the window, and secured a remarkable picture which showed the pieces of the roof still in the air.

The news photographer often goes far afield and faces a very lively danger to secure a good picture. It is important in such work, of course, that the picture appear as soon as possible after the event, before public interest has died out. The camera man on a newspaper must hold himself in readiness day and night to be rushed to the scene of any news story which lends itself to illustration. It may be necessary to travel thousands of miles on a journey of weeks to secure a single picture.

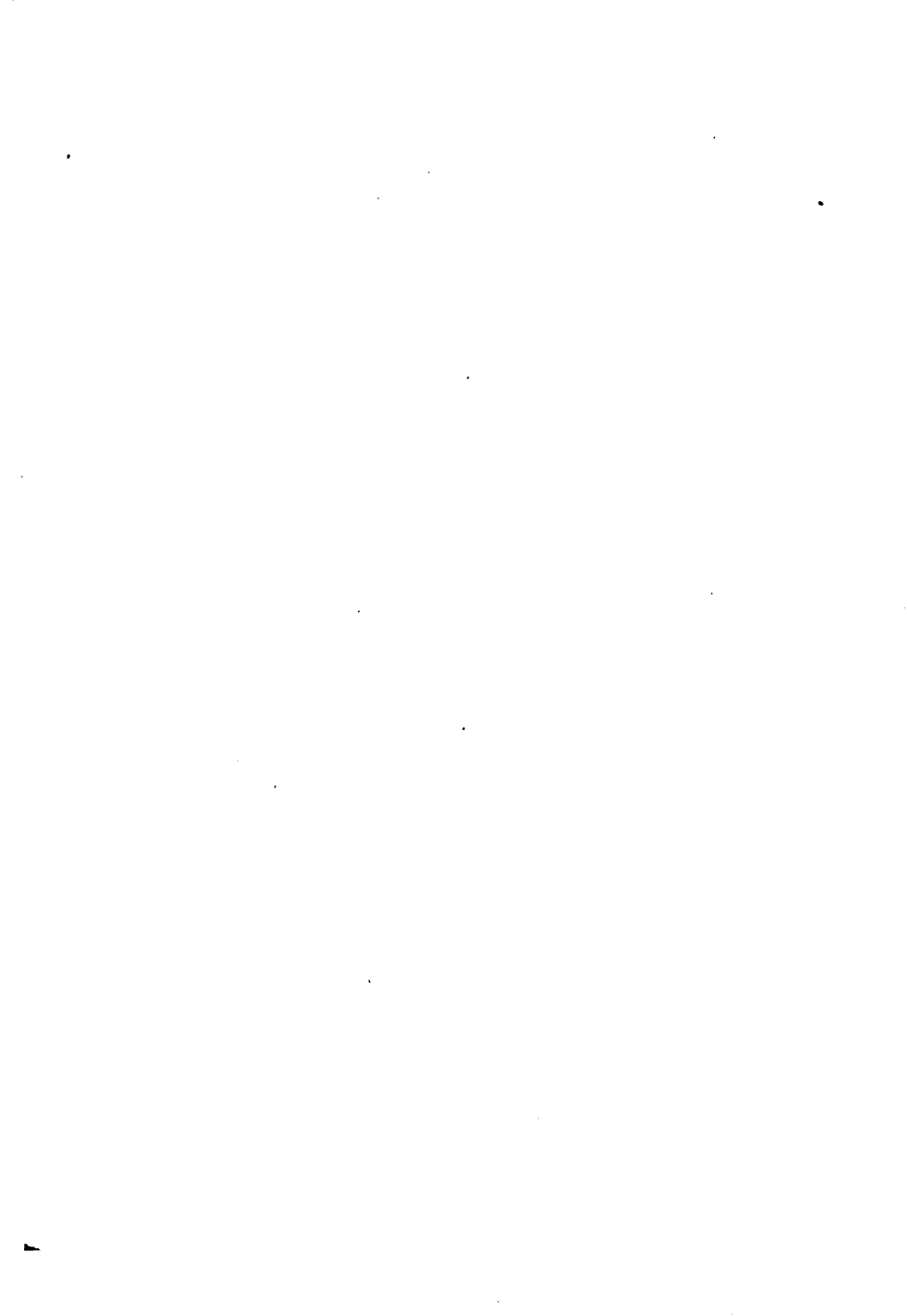
When the news was received of the eruption of Mt. Pelée and the frightful loss of life on the island of Martinique, there was of course a great demand for photographs of the disaster. Here was the greatest catastrophe of its kind since the fall of Pompeii, and a unique oppor-



An air battle between a Zeppelin and a hostile air craft  
(An actual photograph, not a drawing)



The explosion of a shell from a great Austrian gun



## THE NEWS PHOTOGRAPHER

tunity for the camera man. The volcanic isle lay far out to sea and could not be reached by the regular steamships for several weeks. A few hours after the first news was received a sea-going tug had been chartered by a New York newspaper and several reporters and photographers were on their way to Martinique. The little tug encountered very rough weather but the run was made at top speed.

The party arrived to find Mt. Pelée still in eruption and the lost city smoking from the devastating fire. The heat was everywhere intense but the camera men took their pictures at very close range. To secure a "close up" picture of the smoking volcano, they ventured far inland. Lookouts were posted where they might watch the volcano, and the photographers ventured over the cooling lava. When a cloud of sulphurous smoke burst from the crater, the lookouts would signal the camera men, and every one would run to the boats for their lives. There were several very narrow escapes in the singeing heat. As soon as the pictures had been secured the boat hurried to the nearest American port at Key West and the pictures were rushed by train to New York.

Until recently pictures could only be taken in

## THE CAMERA MAN

bright sunlight and even on a cloudy day snapshot work was impossible. As the lenses have been made more powerful and the plates or films more sensitive, a camera man does not worry about his light. Excellent pictures may be made in heavy rain-storms or with the sky darkened by the clouds of smoke from a great fire. By night the news photographer works by artificial light. A bright electric light will suffice for good time exposure in- or out-of-doors. The flashlight is also becoming comparatively common for outdoor work. The camera man no longer waits for daylight to photograph a railroad wreck, for instance, but catches his picture in the flare of a pound or more of flash powder.

All photographs of news interest with even a remote chance of having any future value are carefully preserved and classified in newspaper offices. The great dailies have enormous collections of such views gathered from all parts of the world which are kept in readiness against the time of need. One firm in New York has a collection, which is constantly growing, of more than one million of such pictures. The collection contains thousands of portraits of people in the public life of every

## THE NEWS PHOTOGRAPHER

country in the world, every city of importance has been photographed, as well as scenes illustrating every considerable human activity which by any chance may figure in the news. Let some accident occur, some event of general interest in the most remote corner of the world, a battle, a storm, an earthquake, any untoward event, and by drawing upon the inexhaustible supply of this library the newspapers will appear on the streets an hour or so later with actual photographs of the scene.

The camera man is expected to anticipate the news. He must look far ahead, calculate future news values, and supply photographs which events months after may render valuable. Long before the Presidential nominations are made, for instance, he must secure portrait studies, not only of the probable nominees of every party, but of possible "dark horses." When the names of the nominees are flashed over the country the newspapers must have pictures ready to publish. An hour after the ticket was named in the Republican National Convention at Chicago in 1916, papers in all parts of the country appeared with photographs of Mr. Charles E. Hughes standing beside Governor Whitman of New

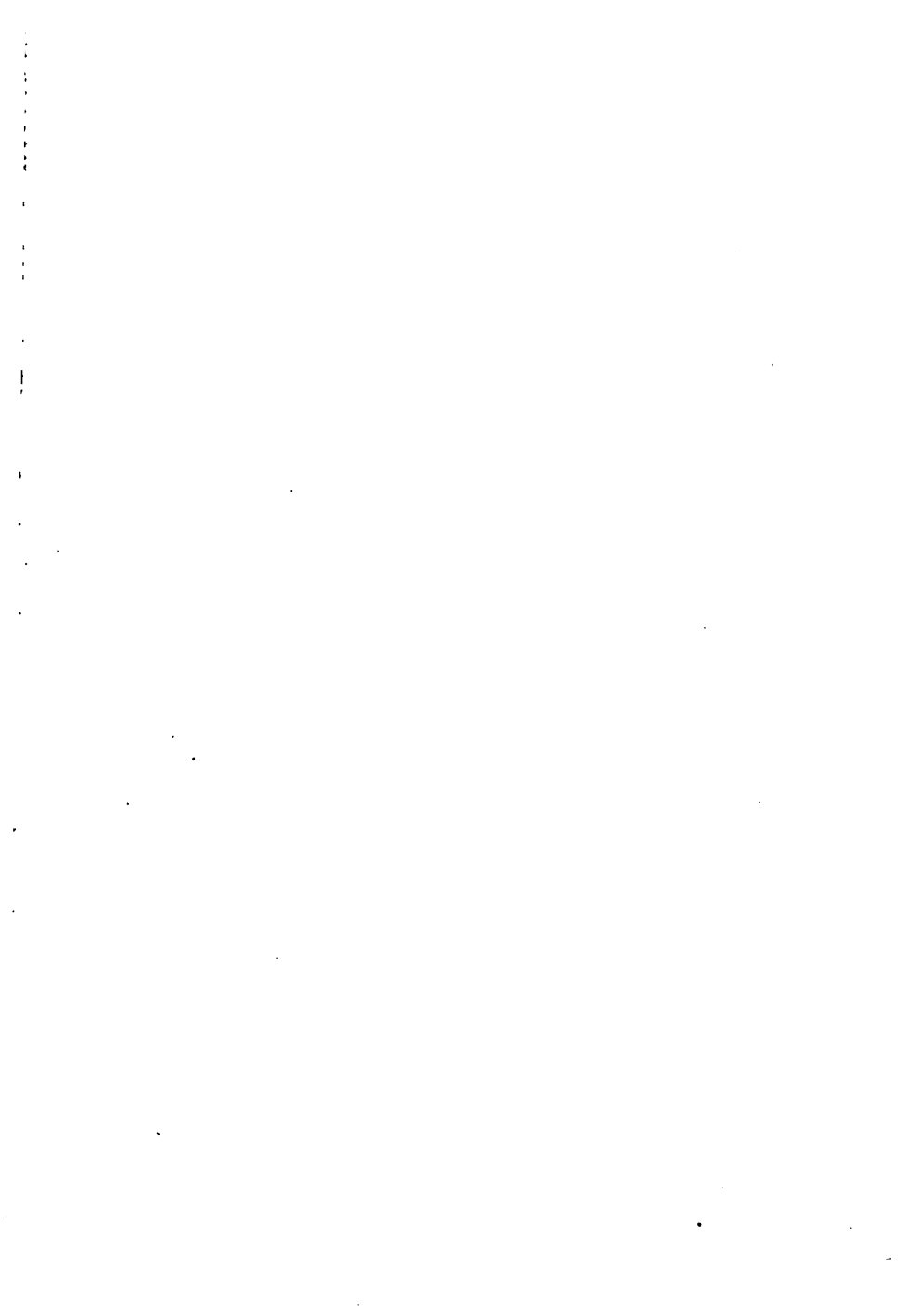
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York who had made the speech of nomination. The photograph had been taken six months before by an alert camera man who had foreseen that such a group would be in demand, and the prints had been widely distributed.

The news of the great naval battle between the English and German fleets off the coast of Jutland came absolutely without warning, but nevertheless American newspapers were able to publish within the hour photographs of the vessels engaged. These photographs had been collected months, even years, before in all parts of the world and kept against a remote time of need, in thousands of newspaper offices. Even the unexpected death of the president of China did not catch the American papers napping, and the cabled announcement of his death was illustrated with his portrait and that of his successor and his cabinet.

It is safe to say that American camera men readily lead the world in alertness and enterprise and in that illusive talent known as a "news sense." In no other country are the camera men so completely organized. In every city, town, and even hamlet will be found professional photographers, or clever amateurs, who are the agents of the great central dis-







A German aeroplane, photographed while flying by a camera man in a second aeroplane higher up—taken by a German aviator officer, in Northern France

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tributing agencies. Every camera man realizes the value of a news picture and is in a sense a free lance. Let any news even "break" in his vicinity, a railroad accident, a smash-up, or violence of any kind, the visit of some famous man, a spectacular fire or the ravages of a storm or flood, and his camera will instantly be enlisted, for the picture will have a definite commercial value. The prize may be won by the most inexperienced amateur, providing his picture is the first to be delivered. With such an incentive the great army of amateurs are quickly educated in the methods of the professional camera men.

The camera used in new photography is usually of the graflex type. For the sake of the layman, it may be explained that a graflex camera is one of those convenient affairs which enable the photographer to focus his subject on the ground glass while the plate or film is in position. The lenses employed are usually very powerful and the exposure is made by means of a curtain shutter which will take a picture in one thousandth of a second. Since a graflex is usually about the size of an ordinary valise, it is of course difficult to conceal it and, when the game must be stalked

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stealthily, a very small hand-folding camera is often employed.

The photographic news men are not permitted to carry a large apparatus, either a hand camera or a tripod camera, aboard an incoming or departing ocean liner. The small folding cameras may be carried in the coat pocket, and the picture often may be caught without the knowledge of the subject. One of the New York newspapers employs a special long-distance camera, known in the profession as "long tom," to bag wary and difficult game. A powerful telephoto lens is used, which is much more powerful than the naked eye. An excellent likeness may be taken with this at a distance of over two hundred feet when the subject, however alert he may be, would scarcely notice a camera, or would think himself well out of range. His photograph in the next morning's paper will come as a great surprise.

No class of assignments promises more excitement than the reporting of fires. The alarm reaches the newspaper offices only a little after the fire houses, and the camera men respond with scarcely less alacrity. The early stages of a fire with the possible rescues, of course, make excellent photographic material.

## THE NEWS PHOTOGRAPHER

Without a minute's delay the camera men hurry to the fire by street car or automobile. The fire lines prove no barrier to them and they share the same privileges and dangers as the firemen themselves.

From years of experience in watching city fires at very close range these news photographers become expert firemen, and can judge with an expert eye the chances of a falling wall, the on-rush of smoke clouds and similar hazards. In a too daring attempt to catch a photograph of an East Side fire from the fire-escape of a neighboring building, a New York photographer was once caught in a perilous position. Escape was cut off. In the general confusion it was impossible for him to make himself heard. By a lucky chance a fireman finally saw the imprisoned camera man and he was brought safely to earth by means of an extension ladder, still grasping his camera which contained several valuable snapshots of the fire.

The direct methods of the American news photographer can be depended upon to get results. An American camera man was assigned recently to make a portrait of General von Bissing in the palace in Brussels. The photographer applied for permission of the au-

## THE CAMERA MAN

thorities at Berlin where he was received courteously, and after considerable formality an officer was detailed to accompany him to Brussels. An appointment was made and in course of time the two were admitted to the General's room. It was explained to the American that under no circumstances was he to address the General. The officer began his explanation, but became nervous and confused in finding himself face to face with so distinguished a personage.

"Your Excellency," he began, "we have come from Berlin. That is—if you will be so kind—" And in his confusion he came to a full stop.

General Von Bissing was seated at a desk and evidently was very busy. The American photographer stepped forward.

"General, I am an American," he began without embarrassment.

"I see that," said the General with a smile.

"And I have come to take your picture," he added without waste of time.

The situation was unprecedented. Every rule of military formality had been broken. The officer stood aghast. General von Bissing, like most men in positions of great re-



Reproduced by Courtesy of *The Motion Picture Mall*

Looking down on Broadway from a skyscraper





## THE NEWS PHOTOGRAPHER

sponsibility, is very democratic and gets his results by the most direct methods.

"Very well," he replied, "go ahead. What do you want me to do?"

"If you will step to the window," the camera man explained. "Now a step this way, a little farther please. No, this way," and to the horror of the attending officer the photographer laid his hand on the General's arm and arranged the pose. The picture was taken in a few seconds.

"Thank you, General," said the unabashed camera man easily.

"I hope your picture turns out well," replied General von Bissing pleasantly and the interview was over.

Once outside the door the officer expostulated.

"How did you come to address his Excellency? It is most unprecedented. And you laid your hand on him. How could you do so?"

"*Mein lieber freund*," said the American, "I have photographed three American Presidents and a general more or less is nothing to me."

## CHAPTER V

### MOTION NEWS PICTURES

**A**CTUAL moving pictures of events of public interest may be seen in the motion-picture theaters almost as quickly as the news itself can be reported and printed in the newspapers. The camera man has learned to utilize every moment between the exposure of the film and its appearance at the theater. A baseball fan, for instance, may watch the last inning of a game in the afternoon, and, by the time he has dined and found his way to the theater, may see the closing play reproduced on the screen.

To accomplish this the camera man works at top speed. He employs perhaps half-a-dozen dependable messengers, and as soon as a good play has been taken the film is detached and rushed at once to the dark room. The messenger uses the quickest possible means of communication. The pictures of the game reach the dark room in half-a-dozen sections, and the

## MOTION NEWS PICTURES

films of the early innings have been developed and printed before the game is over. In illustrating a world series, when speed is essential, some of these films will be completed and put on the train for distant cities before the game has been decided.

One of the most expeditious pieces of work of this kind was the filming of the last Presidential inauguration. It was necessary to carry the exposed films from Washington to New York, a ride of five hours or more, and have them appear on Broadway on the evening of the same day, besides rushing them at the earliest possible moment to many cities throughout the country. The movie man engaged four messengers and cut off his films with a watchful eye on the time-table. They were carried on four different trains to New York, but the continuous picture of the inauguration appeared early in the evening on the screen of several Broadway theaters.

The motion-picture films in the "weeklies," as the news pictures shown every week in the theaters are called, usually run to about one thousand feet. To obtain pictures of important events the country over, a regular staff of moving-picture operators is kept in constant

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touch with the editor. The "weeklies" are organized much the same as any newspaper office. When any news "breaks," a man may be rushed to the scene in a few hours.

The photographer who responds to a fire alarm or the call of any disaster often faces a very lively peril. In a great harbor fire in New York recently a moving-picture operator aboard a special tug set up his camera behind a fire screen such as the marine firemen use for protection against the heat, and secured an amazing "close up" of the burning docks and ships, although the heat blistered both his face and his films. A movie man, again, was among the first to reach the scene of the famous *Eastland* disaster at Chicago. It will be remembered that the steamer, carrying some 2000 excursionists, turned turtle at her dock. The camera man climbed to the hull of the overturned boat and secured actual "close ups" of the passengers as they were rescued. The film was developed and exhibited in the theaters of Chicago in the evening of the same day.

One of the liveliest local assignments recently came with the outbreak of hostilities at a strike at Bayonne, New Jersey. There was considerable shooting, and much valuable prop-



A motion news camera man (Lawrence Darnour) filming Dr. Cook at sea



## MOTION NEWS PICTURES

erty was destroyed. Now the camera man is as cordially detested by the average striker as any strike breaker. The moving pictures, as the strikers have learned to their sorrow, are indisputable evidence. A jury which recognizes a striker in a film handling a gun or burning a building would naturally convict him without further argument. One of the youngest and most daring moving-picture operators, Lawrence Darmour, who chanced to be in the thick of the fighting, recalled his experience for us.

"The most dangerous moment?" Darmour repeated our question. "It was all pretty lively, but the liveliest time of all came one morning when the strikers and the troops actually faced one another at short range. Both sides were firing from behind protections. I had picked out a roof about two hundred feet away, and set up my camera behind a brick chimney. This protected me from the strikers' fire, and the troops were likely to leave me alone. There was plenty of action. The strikers would send out small boys of five or seven years, who would creep up and pour oil on the buildings and set fire to them. The soldiers would n't fire on the kids, of course, and

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so they got away with it for a while. I caught all that. It was the first time I had heard a bullet sing through the air, but I got used to it.

"Once they pretty nearly got me. I had set up on the street and was grinding away when an ugly-looking striker rushed up. He was a foreigner of some sort and I could n't understand him.

" 'You wanna brick?' he asked.

" 'I beg your pardon?' I said!

" 'You get brick!' he shouted and made his meaning clear by shying one at the camera. Oh, yes, it was a lively assignment all right."

The turning—grinding is the professional term—of the crank of a movie camera is a small part of the work of picture taking. First of all, the movie man in the field must be a strong, well-set-up young fellow. The average outfit for making these films, when loaded ready for action, weighs about fifty pounds. In news photography the camera man must get about very quickly. The action must be anticipated. If a picture is to be made of the President, for instance, taking the oath of office, the camera man must be sure of his exposure, for the action will scarcely be repeated. Despite his heavy handicap, the movie man is



## MOTION NEWS PICTURES

no less alert than the photographer with the hand camera. With his outfit strapped to his back to leave his hands free, and balancing his tripod as the tight rope walker carries an umbrella, he manages some way to be in position for the picture.

Every one is familiar nowadays with the oddly shaped movie camera, so high and narrow, and the bulky tripod upon which it rests. The heavy tripod is indispensable. No matter under what pressure of time the camera man works, his machine must be exactly level and stand upon a firm foundation. The slightest vibration will be magnified enormously in the finished picture. The film in the camera measures scarcely an inch in width and, when this is enlarged on the screen to perhaps twenty feet, the slightest movement is instantly noticeable. Let a child knock lightly on the tripod during the exposure and the object later may jump entirely off the screen.

The movie man again is expected to catch a continuous action of any event. The man with a hand camera may take a picture in a thousandth of a second at any stage of the action and his work is done. A chance exposure in the movies would appear disjointed and incom-

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plete. Suppose the movie man is detailed to film some one shaking hands with the President. The film must show the figures approaching, then the handshake, and the withdrawal. If he catch only a part of the action, begin in the middle, or end before the greeting is over, the picture would be fragmentary, even ridiculous.

The same rule applies to virtually all motion-picture photography. Imagine a film showing a man running the bases, which starts after the ball has been struck; or a player desperately sliding for home, which ends abruptly before he reaches the plate! As one realizes the extraordinary difficulties of this work, he will learn to appreciate more fully a really artistic news reel.

The search for good positions often leads the movie man into queer places. At any public event which lends itself to movie photography, the cameras will usually be seen picturesquely disposed at every possible vantage point. It is the boast of the movie man that he can go anywhere the hand camera man goes. If the best point of view should be from the top of a tall tree, the movie camera will be hoisted in some way to the best position. A movie man will

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cross an exposed girder at a dizzy height, carrying his fifty-pound outfit.

One of the most ingenious applications of the motion picture is its use in the schoolroom, which is mentioned elsewhere in this volume. In one of the schools of journalism, motion pictures of lively news events are already thrown upon the screen and the students are then required to "report" the scene they have just witnessed. Since the picture unfolds with lifelike rapidity, the students learn alertness and readiness of perception. Certainly the films form the most fascinating school text-book imaginable.

"In taking these news motion pictures, how does the camera man keep within striking distance of the principal action?" some one asks. "One may watch a moving automobile, a parade, a locomotive, or even a runaway on the screen without being left behind." The trick is, of course, very common in motion-picture work. The camera is mounted on a locomotive or an automobile, which runs parallel to the object and catches a continuous "close up" even when traveling at a high rate of speed. The automobile used for this work is equipped with a "straight jacket," a rigid steel

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frame fastened about the movie man which holds him in an upright position no matter how the car may rock and plunge. He thus has his arms free to operate his camera which he would otherwise be using to hold on for dear life.

A battery of moving-picture cameras once put a formidable warship to flight. In the early days of the European War, a tug carrying several moving-picture cameras cruised for hours at the entrance to New York harbor in search of the British cruisers which were reported to be watching for any German steamers which might try to put to sea. After a long search they sighted a cruiser, apparently British, and bore down upon her.

The movie cameras were hidden behind tarpaulins. When they came within photographic range of the warship, they found that her name plate had been covered, but it was clear that she was either the *Suffolk* or *Sussex* of the British navy. The camera battery was quickly unmasked and got into action. The manœuver was instantly seen from the bridge of the warship, which did not care for publicity and turned without a moment's hesitation and steamed away at forced draught.

## MOTION NEWS PICTURES

The circulation of motion news pictures is astonishing. Mr. Pell Mitchell, the editor of "The Mutual Weekly," prepared some figures for us which gave an entirely new idea of the extent of their distribution. "Within a week after an important news event," Mr. Pell explained, "the scene may be screened before audiences aggregating about two million people in the United States alone. For months to come these films will be shown in small towns. Many of these films are syndicated to Europe, South America, Australia, the far East, and even South Africa.

"A friend of mine once saw in South America a film of a world baseball series played in New York just a year before. No danger, by the way, will frighten the motion-picture man. Naturally, he is well compensated. An efficient man receives from fifty dollars to one hundred dollars a week. I would rather pay the higher price. There are many twenty-five dollar a week men, but few really good ones. It is an extra hazardous employment which demands at the same time the news instinct and a quick, artistic perception."

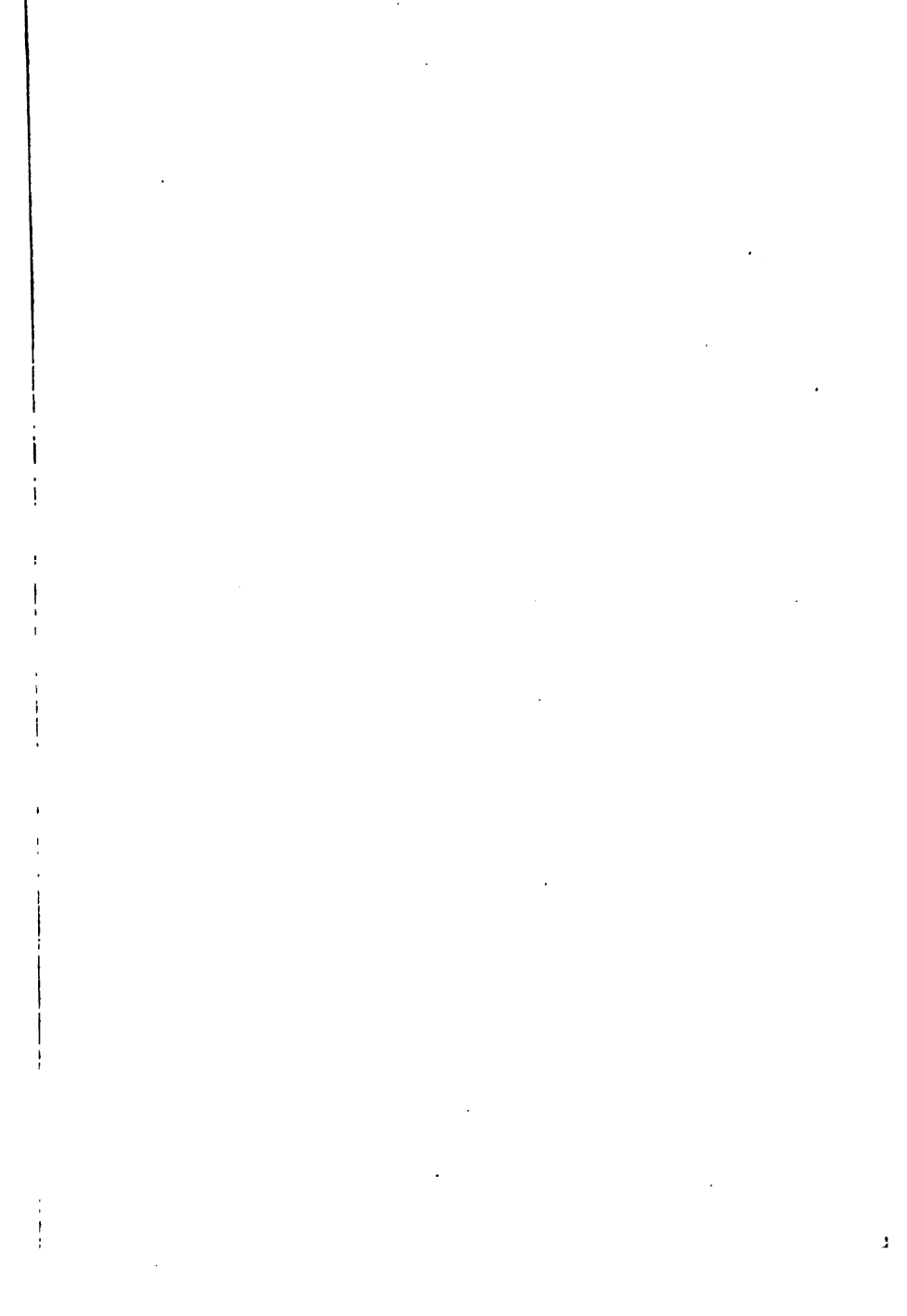
There are hundreds of free-lance operators scattered all over the country who are con-

## THE CAMERA MAN

stantly on the alert for news. The weeklies which display the news are good customers. Since it is so important that the pictures be secured at the earliest possible moment, they will pay a good price for the first film which reaches them, sixty cents to a dollar a foot for the film of a live news event. Now a foot of film is run off in about one second, so that the movie operator is paid at the rate of about one dollar every time his watch ticks, and this runs into money very fast. With such an incentive, it is natural enough that the movie man should be early on the scene of any accident.

Special films are often made at great expense for private exhibition. A portrait study, a family gathering, a wedding, or a dinner party, or reception may be filmed merely for family use. These records are an interesting evolution of the old family portrait albums. In after years the record will be highly prized. The charge for making such films, if a journey be involved, is usually from fifty cents to one dollar a foot, and the family films frequently run to four or five hundred feet.

A movie operator, who has had considerable experience in this work, explained to the writer that these films often form surprisingly com-





A battery of camera men afloat



A daring close-up of a harbor fire



## MOTION NEWS PICTURES

plete records. If a wedding is to be photographed pictures will first be taken of the arrival of the guests, with the reception-room and the special decoration for the occasion. A "close up" is made of the bride, showing her gown from every side and several careful studies of the face. The parents, the bridesmaids, and ushers are taken separately. The ceremony itself is filmed from an advantageous point of view, and of course the wedding breakfast or dinner which follows. The film probably ends appropriately with the departure of the couple with the inevitable shoe thrown for good luck. What group of family portraits ever painted could rival in interest in years to come this living picture?

Several elaborate films of this kind have been made by the same operator of social functions at Newport. His camera once played a unique part in a week-end party. Pictures were made of each of the guests on their arrival, then came many animated scenes on the tennis courts, the golf links, and of automobiles and coaching parties. A long stretch of film was used up on the dinner party. The movie man hurried back to town to develop and print his films, and on the following night returned and gave a

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private exhibition of his picture. The film became the private property of the host.

Many children's parties are taken in this way. Studies are made of the children at play, riding, or driving. Their pet dogs or ponies, of course, take a prominent part. The movie man, as might be expected, is made very welcome by the children, and the private movie exhibition, which follows a few hours later, is certain to make the party a great success. In many private homes will be found complete outfits, including the projecting cameras and screens for running off the films. The private movie seems destined to have a very general application in the future.

The movie man is often found aboard private yachts on extended cruises, one operator accompanying a yachting party around the world. The movie man lends a new fascination to a cruise. His camera preserves delightful pictures of the life aboard. Every port of call and the scenes in strange harbors and picturesque foreign ports are thus preserved. When a visitor comes on board it is, of course, made a matter of photographic record. The films are usually developed on board and exhibited in the cabin, for many of these

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yachts have their own moving-picture theaters. The camera man who encircled the globe on a yachting cruise, took over six thousand feet of film, which included visits at Gibraltar, Egypt, India, and China.

A unique use has been found for the moving-picture camera in recording various athletic events. All great athletic contests are likely to be filmed for exhibition purposes. The athlete finds these pictures of absorbing interest. A moving picture of a football game, for instance, enables the players and their trainers to study every play slowly and in detail. The action may have passed so quickly as to deceive the eye, but the film may be run through again and again.

The crack runners have been enabled to study their strides, the foot and knee action, and the position of the body. The motion pictures of high or broad jumps and hurdling have taught the athletes much that is new about their art. The coaches of racing crews, again, employ the movie man to take detailed pictures of their craft, and "close ups" of the stroke of the oars which have proved of great assistance to them in training.

The churches have found the moving-picture

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camera valuable in many ways, and have been quick to utilize it. Many churches are equipped with regular projecting machines in the Sunday-School rooms, lecture halls, or even in the main auditoriums. The term "silent sermons" has been aptly given to some of these films. Elaborate studies, often six reels in length, have been prepared to illustrate various Biblical texts. These religious or educational films, again, may illustrate travels in the Holy Land or famous scenes of Biblical history.

The motion pictures are often used to arouse interest in charitable work. Studies are made, for instance, of a home or institution, and the living pictures of its work make a direct appeal to the sympathies which no written or spoken word could give. An elaborate film of this kind was prepared recently to illustrate the misery of child life among the poor in great cities. The motion picture was placed in a closed wagon, with the lens protruding through a hole in the side, so that the photographers could take their pictures without arousing the suspicion of the children. The groups were entirely natural. Pictures were made of children playing in the gutters, searching for food in garbage cans, huddling in doorways or shiv-

## MOTION NEWS PICTURES

ering in the snow. In the complete film these scenes would be contrasted with pictures of children playing happily in fresh air camps or enjoying outings in the mountains and the beaches.

## CHAPTER VI

### THE CAMERA MAN AT SEA

**A**BOARD almost any ship nowadays which puts to sea may be found one or more amateur photographers. On many voyages the camera is carried by more or less skilful hands to the farthest corners of the Seven Seas. Sailors' yarns of travel and adventure, which are the most fascinating stories in the world, have thus been illustrated and verified. Thanks to the camera, the science of geography has become a thing of life.

On any pleasure voyage the camera has come to be an almost indispensable part of one's equipment. The long, bright, care-free days on shipboard especially lend themselves to illustration. The happy groups on the sunny decks with their picturesque backgrounds make fascinating subjects and, in years to come these chance snapshots become a never-failing source of pleasure and amusement.

Aboard the larger and newer ocean liners

## THE CAMERA MAN AT SEA

completely equipped dark rooms have been provided, which are placed at the disposal of the passengers. Some of these rooms are supplied with electric ruby lanterns, trays, and running water to accommodate a score of amateurs. The steward in charge will be found to be an experienced photographer who will give practical advice, even lend a helping hand in developing and printing. One may entrust the holders with their exposures to his skill and be supplied next day with the finished prints. The demand for material often supports a small photographic supply shop where the necessary materials and even cameras are on sale.

Aboard the great modern liners photography has become a highly developed art. On the first arrival of a new steamer her decks and cabins are of course photographed in detail, and the pictures are published broadcast throughout the country. As the steamers have grown larger and more luxurious they have lent themselves to more careful study. More than three thousand photographs have been taken, for example, aboard one of the new transatlantic liners, illustrating her public and private cabins, and the daily life of her population of some five thousand souls above and below decks.

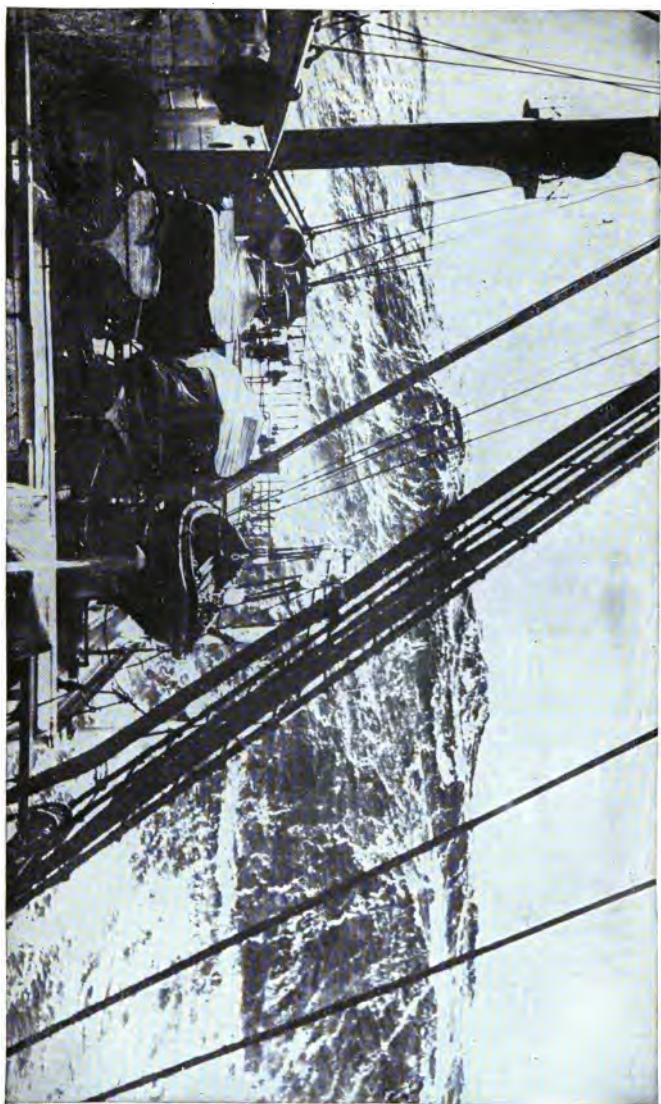
## THE CAMERA MAN

The photographer who made these studies crossed the Atlantic twelve times in order to complete the collection.

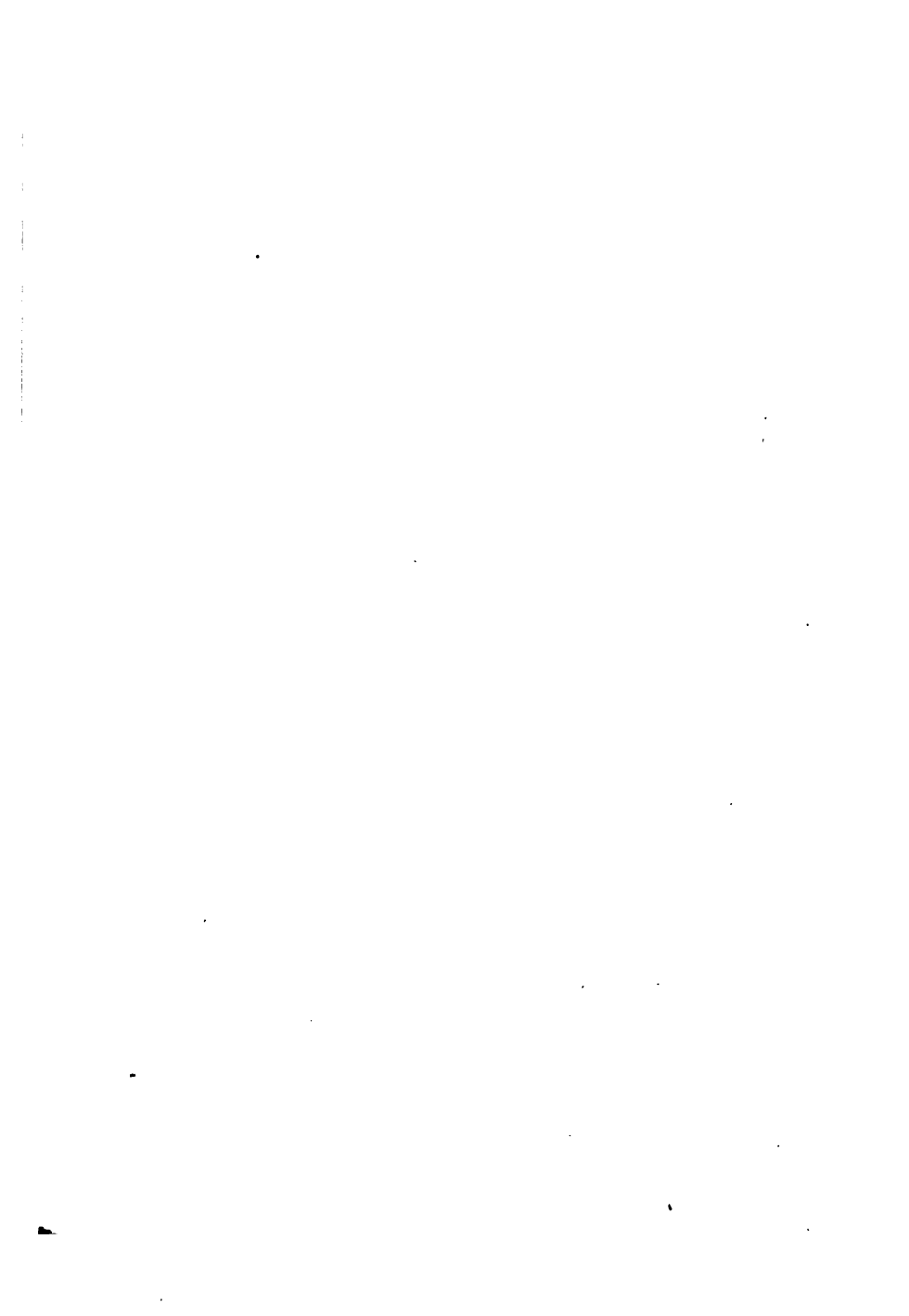
The ship's photographer in this case made a special trip abroad and secured his first photographs, a large collection, before the steamer sailed on her maiden trip to America. Many more pictures were made on the trip over, and these were developed and printed in large numbers in the ship's dark room at sea. When the steamer reached New York early one morning, to be boarded by more than a hundred reporters, the ship photographer met them at the gangway with hundreds of pictures ready for distribution.

The newspaper men could take their choice of many beautiful photographs of the liner from various points of view, typical deck scenes and many studies of the life of her passengers in their luxurious cabins. Within an hour or two the early evening editions of the newspapers appeared on the streets with these pictures, and the photographs were already on their way to other cities. The month spent in preparation and the double crossing of the Atlantic was well expended in saving an hour or two of valuable time.





A great wave photographed from the bridge of an ocean liner



## THE CAMERA MAN AT SEA

During her stay in port many photographs are taken of a steamer's cabin, deck, art treasures, and the details of her equipment, but it is only when at sea that such scenes do her justice. A special trip across the Atlantic and back was made in one case to illustrate steerage accommodations. The dining-rooms, the decks, and social rooms of this cabin were photographed again and again with their passengers caught in unconscious poses. Another round trip was made merely to obtain characteristic views in the first cabin, and the camera man returned with flashlights of brilliant scenes in the great ballroom, or dinner parties in the palmroom, or of sociable groups gathered about the broad fireplace of the smoking-room and similar scenes.

On the long pleasure cruises to foreign lands again the camera man is one of the most popular members of the ship's company. Day by day, whether at sea or ashore in some strange land, the ship's photographer goes about illustrating hundreds of scenes which will in after days enhance the pleasures of memory. The broad, sunny decks of a modern pleasure cruiser are especially well suited for instantaneous work. The daily programs of deck

## THE CAMERA MAN

sports and athletic contests, tea parties, the dances, every possible phase of the happy care-free life of these vacations may be preserved. One versatile American photographer traveled more than eighty thousand miles within three years on such cruises, his journeys carrying him to the West Indies, South America, the Land of the Midnight Sun, the Mediterranean, the Orient, and around the world.

A special photographer is usually detailed to accompany any distinguished personage on a sea voyage. No matter how many pictures may have been published, or how familiar a figure may become, the deck of an ocean liner provides a new and interesting setting. Let some distinguished foreign author, statesman, or general announce a visit to America, and one or more photographers will be rushed across the Atlantic to return with him. The average newspaper reader will readily recall many interesting snapshots of famous people on ship-board. Some of the chance pictures taken of ex-President Roosevelt at sea chatting with the crews or enjoying the deck sports are among the best and most characteristic pictures of this much photographed personage.

Even the motion-picture photographer is sent

## THE CAMERA MAN AT SEA

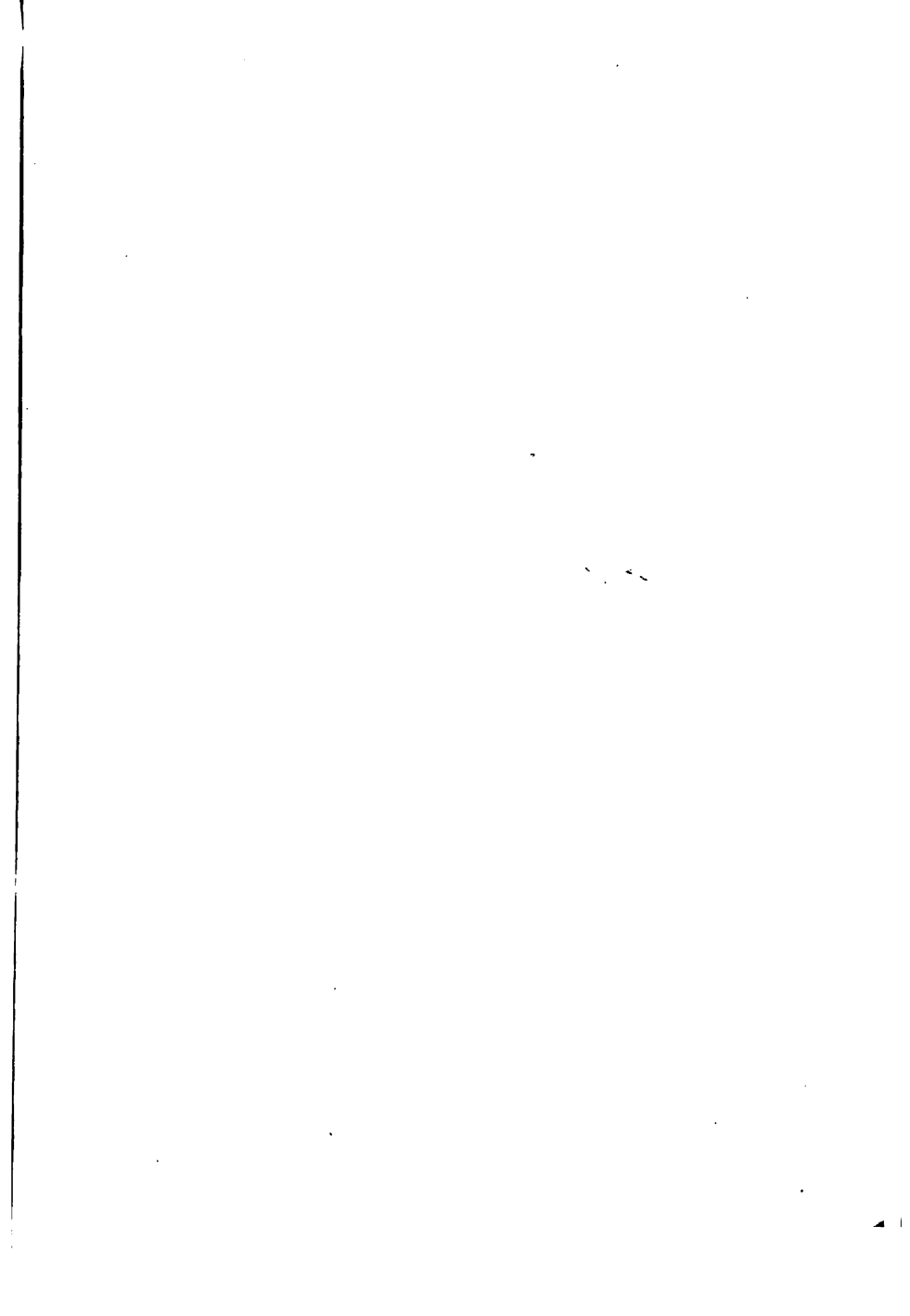
on long ocean trips to film interesting deck scenes. The first movie man to cross the Atlantic on such an errand was probably Lawrence Darmour, who sailed with the Ford peace party to Norway. Darmour is one of the youngest men, or rather boys, to operate a motion-picture camera, having commenced his highly adventurous career at the age of sixteen.

Several thousand feet of very interesting film were made while "Fording the Ocean," showing special studies of the prominent members of the peace party with scenes of their daily life on shipboard. It may be recalled that one of these pictures, showing a famous clergyman playing leap frog, caused considerable discussion. The demand for these pictures were so insistent that they were rushed back by the first steamer, and by special arrangement taken off the ship at the entrance to New York Harbor and carried by fast motor boat and automobile to the studios in Flushing. Darmour's return trip, which also proved very interesting, was made with Doctor Cook, the Arctic explorer, who posed for several series of pictures at sea. All these films were shown in hundreds of theaters throughout the country.

## THE CAMERA MAN

That waves "roll mountain high" is proverbial but inaccurate. The dispassionate eye of the camera, showing exactly how great waves appear close up, has proved that the artists are all wrong or nearly so in their wave pictures. The sea has been photographed in every conceivable mood with innumerable effects of light and shadow, and these pictures often have a beauty and impressiveness which have escaped the marine artists. The spirit of the storm has seldom been expressed so well in any picture as in the remarkable photograph which is reproduced herewith (page 112). The exposure was made from the bridge of a great ocean liner more than fifty feet above the water. A moment after the exposure had been made the great wall of water swept the ship's deck, carrying away one of the three lifeboats in the foreground.

A daring moving-picture photographer recently faced a storm for hours aboard a small trawler in the North Sea to secure "close ups" in a high sea. The camera was lashed to the bridge, and the operator, literally holding on for dear life with one hand, turned the crank with the other. The sea broke over the camera





A spirited marine study



## THE CAMERA MAN AT SEA

repeatedly, but the film proved to be well worth the effort.

The marine photographer is in a peculiar sense a specialist in his profession. His work is confined as a rule to studies of pleasure craft, yachts, and motor boats of every type, which requires considerable technical skill. To catch a spirited picture of a yacht under sail, for instance, the marine photographer must be a yachtsman and know every rope, block, and sail, and have a good working knowledge of practical seamanship. His equipment often includes a fast motor boat, that he may encircle his subject, if necessary, to catch her at the right angle. He must make a careful study of his subject and familiarize himself with her good points under all conditions of wind and weather. Days may be spent in waiting for the right conditions for a picture, as the yacht owner is usually an exacting customer.

No class of photographs is perhaps more difficult to procure, or more highly prized, than the actual pictures of shipwrecks. Many excellent pictures of this kind have been taken by a lucky chance without danger, while others have been secured at great hazard. A good

## THE CAMERA MAN

wreck picture is likely to have considerable value. A negative which shows the exact position of a ship or the nature of an injury may prove to be very valuable evidence in settling claims for insurance or salvage.

When news of a near-by wreck reaches any great seaport, assistance in the form of powerful wrecking machinery is quickly rushed to the scene. A camera is usually a part of this equipment. On reaching the wreck, no matter how urgent the demand for help, some one usually finds time to take a snapshot of the vessel in distress. The wreck is often photographed with great care from several points of view. Later, as the work of salvage progresses, additional pictures are made of the progress of the undertaking. It often happens that very interesting problems in marine engineering are worked out at sea under unusual circumstances. The vessel must be raised on pontoons, or a breach in her sides stopped with canvas, and the actual photographs of the work are interesting and valuable.

One of the most remarkable collections of wreck photographs, in America at least, is that of an amateur living on the south shore of Long Island, whose pictures cover a period of

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more than twenty years. The shore in this general region has been the scene of many wrecks, some of them of dramatic interest. Thousands of ocean craft of every conceivable kind pass here on the way to and from New York, and in the winter months it is comparatively common for some of them to lose their way in a blinding storm and be driven ashore. The photographer of wrecks is always on the alert, and whenever a ship comes ashore, although it may be twenty miles away, starts at once camera in hand.

The shore in this region, although flat and sandy, is still very treacherous. The outer coast line on the southern side of Fire Island is separated from the mainland by the Great South Bay, two miles or more in width. When the ice will bear him, the camera man crosses on foot, or by the swift little ice yachts common to this region, known as "skooters." At times the crossing must be made by boat. Wreck weather is usually cold and boisterous, and the camera man has faced many a violent storm.

The wrecks are usually driven well in shore so that a good picture may be made from the beach. Several times the photographer has

## THE CAMERA MAN

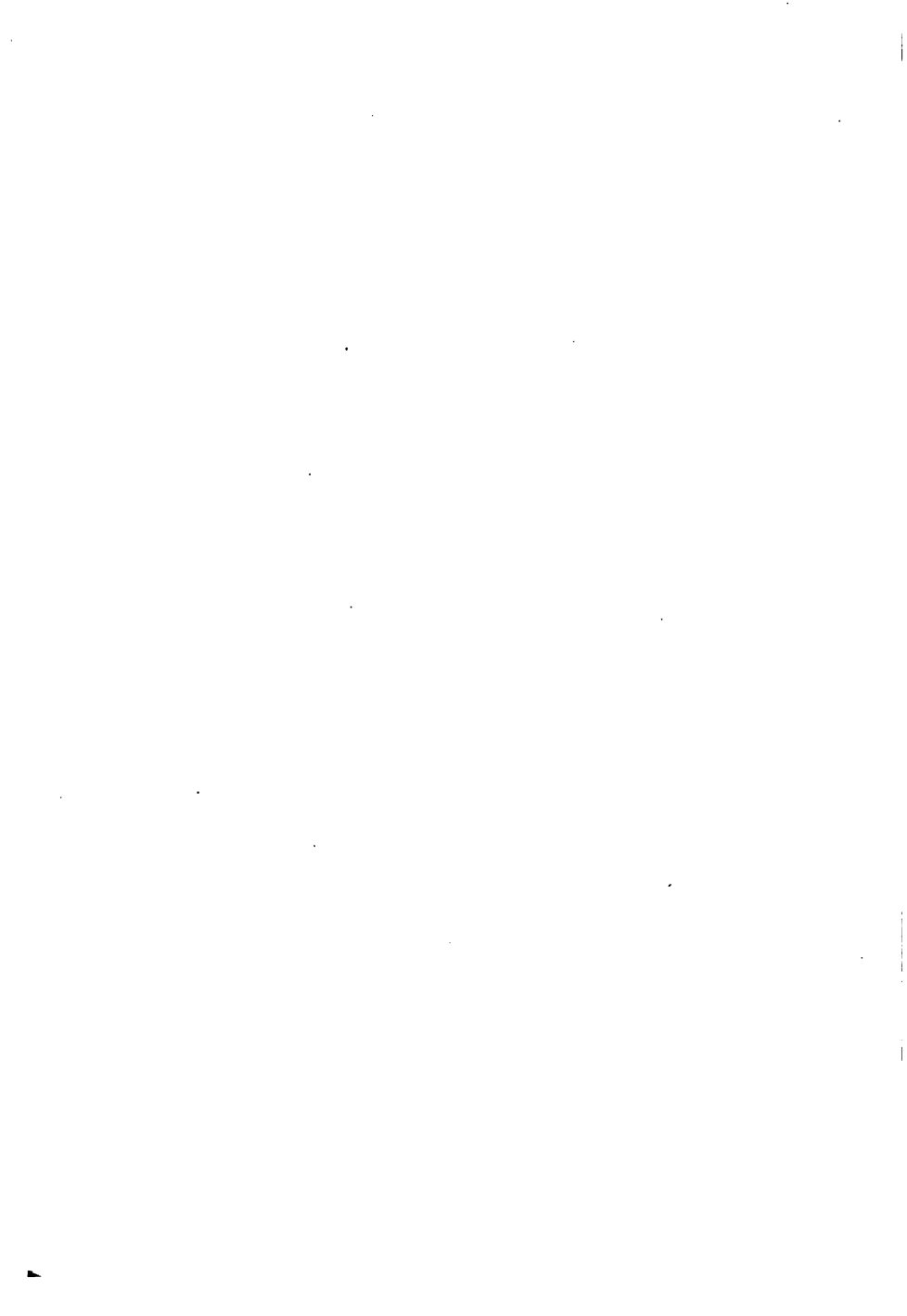
been among the first to arrive at the scene of the wreck, and after taking his pictures has assisted in saving the lives of the crews.

The most tragic picture of his collection was made several years ago of a wreck well in-shore which was driven in one night in a freezing storm. The sea was so high that the life-savers were helpless. No boat could reach the wreck, and the men on shore stood hour after hour while the ship pounded to pieces and a thick coating of ice covered its rigging. From the deck two figures were seen to crawl into the rigging to escape the sea. For a time they signaled frantically to the shore and then gradually as the ice thickened on the rigging, they ceased to move.

One of the most amazing conquests of the camera man has been his success recently in deep sea photography. Protected by a strong diving bell, he has explored the floor of the sea and returned with actual photographs of its life. Not only the hand camera but moving picture outfits are operated at great depths. The diving bell which is spherical in shape is constructed of stout steel plates to withstand the enormous pressure of the water. It is large enough to hold a photographer with his



Mount Barrow, Strait of Magellan. The camera is carried to the farthestmost corners of the seven seas



## THE CAMERA MAN AT SEA

camera. Several circular windows of heavy plate glass open on the sides and the bottom of the diving bell so that the camera may be pointed in any direction.

The deep-sea photographer takes with him the light for his pictures. An electric search-light may be directed through the glass windows, which must, of course, be sufficiently powerful for instantaneous work. The power is carried by floating cables connected with a dynamo at the surface. The air which keeps the camera man alive is pumped into the bell through a long flexible tube exactly as a diver is supplied. An entirely new world has thus been opened for the photographer. Comfortably seated in his diving bell he may select the best point of view for photographing the marvelous scenery at the bottom of the sea, and secure detailed studies of its plant and animal life. The most remarkable picture ever taken in this way was a long film showing an actual battle between a diver and a shark. The camera proved quick enough to catch the rapid movements of the great fish as it darted back and forth. The submarine photographer has also proved himself highly useful in securing pictures of wrecks at considerable depths, and

## THE CAMERA MAN

again his pictures are of great value to engineers in carrying out construction work below the water's surface.



## CHAPTER VII

### COMMERCIAL PHOTOGRAPHY

**T**O-DAY one can scarcely understand how business was carried on before the invention of photography. Like the telephone, the camera has become indispensable. There is scarcely a line of business in all our complicated modern life which has not profited more or less directly by the work of the camera man. A few years ago all photographers fell into two general classifications, the professional portrait photographer and the amateur. The greater part of all professional work is done to-day by the commercial photographers. Their output each year in the United States alone amounts to tens of millions of dollars.

The field covered is so wide that it is impossible to mention even the most important customers of the camera man. Take a single example. Have you ever stopped to think of the batteries of cameras and the army of photographers who are employed to make the pictures

## THE CAMERA MAN

which illustrate the catalogues, circulars, pamphlets, and general advertising literature which flood the country? There is scarcely an article in use to-day which is not advertised with the aid of the camera. The advance in commercial photography has been very rapid, and wonderfully clear and life-like pictures are produced so cheaply that every one may avail himself of their help. The improvement in half tone and color reproduction has also kept pace with that of photography, which makes it possible to reduplicate the camera man's work indefinitely.

The delights of the movies have been quickly utilized in a variety of commercial enterprises. The moving-picture railroad car has traveled from one end of the country to the other. The first of these perambulating theaters was equipped by the New York Central Railroad to instruct its employees. It is constantly passing over the line, stopping for two or three days at the various car shops and the cities and towns where the employees may be reached. This unique theater seats seventy people and the exhibitions are always free. The visits of the traveling movie are naturally looked forward to with pleasure. It is claimed that the

## COMMERCIAL PHOTOGRAPHY

educational campaign of which the movies are a feature has actually reduced the number of railroad accidents from thirty to forty per cent.

The films exhibited in the traveling movie theater are often elaborate and would entertain a more critical audience. One of these runs to two thousand seven hundred feet and contains one hundred and seventy-eight scenes. A realistic railroad wreck, in which two trains are crushed to kindling wood, was arranged especially for this picture. It serves as an object lesson to impress upon the railroad employees the importance of observing signals. The scene is introduced in the most approved movie fashion. The wife of the signal man dreams of a wreck, and the picture of the approaching trains and the smash which alone costs thousands of dollars to stage is "faded in." Following the wreck there are heart rending scenes in the emergency hospital to drive home the moral.

Still other scenes, taken in the machine shops, tell the story of a workman who loses his eyesight because he neglects to wear protecting goggles.

Several automobiles have been deliberately smashed up in made-to-order collisions before

## THE CAMERA MAN

the movie camera to illustrate for the flagmen's and engineers' benefit just how to avoid such accidents. The danger to trainmen of overhead bridges is illustrated in several movie films. One of the commonest causes of accident is due to carelessness in crossing railroad tracks, and thousands of pictures have been taken by the railroads in illustration. The movie camera in this work is set on the locomotive and realistic films are made of dangerous crossings as the train approaches. Such films show that the tracks only a few feet before the approaching train with its danger whistle and bell going, often will be crowded with people who look disdainfully at the locomotive and scorn to hurry their pace. A lively baseball game was interrupted by a movie camera installed on a cowcatcher where the players, intent on the ball, paid no attention to the locomotive. All such pictures prove extremely valuable in the general educational campaign carried on by the railroads to safeguard human life.

A valuable service is performed by these railroad photographers in making photographic studies of the natural beauties of the country. To secure views of the scenery the camera man

## COMMERCIAL PHOTOGRAPHY

will often travel far afield. Such pictures will be used for illustrating advertising literature, while enlarged photographs will adorn the walls of ticket offices and agencies all over the world. Many of the best photographs ever made of the natural beauties of America have been secured in this way.

The railroad photographer will often devote weeks at a time to the journeys for securing these pictures. Complete dark rooms are fitted up on special cars to facilitate the work, and the camera outfits are carried on horse- or mule-back for many miles over the mountains to secure the best point of view. One of the most interesting series of this kind is the continuous panorama taken of both shores of the Hudson River for one hundred and fifty miles. It was necessary to take hundreds of photographs, which when matched and reproduced give an unbroken record of three hundred miles of this famous shore line.

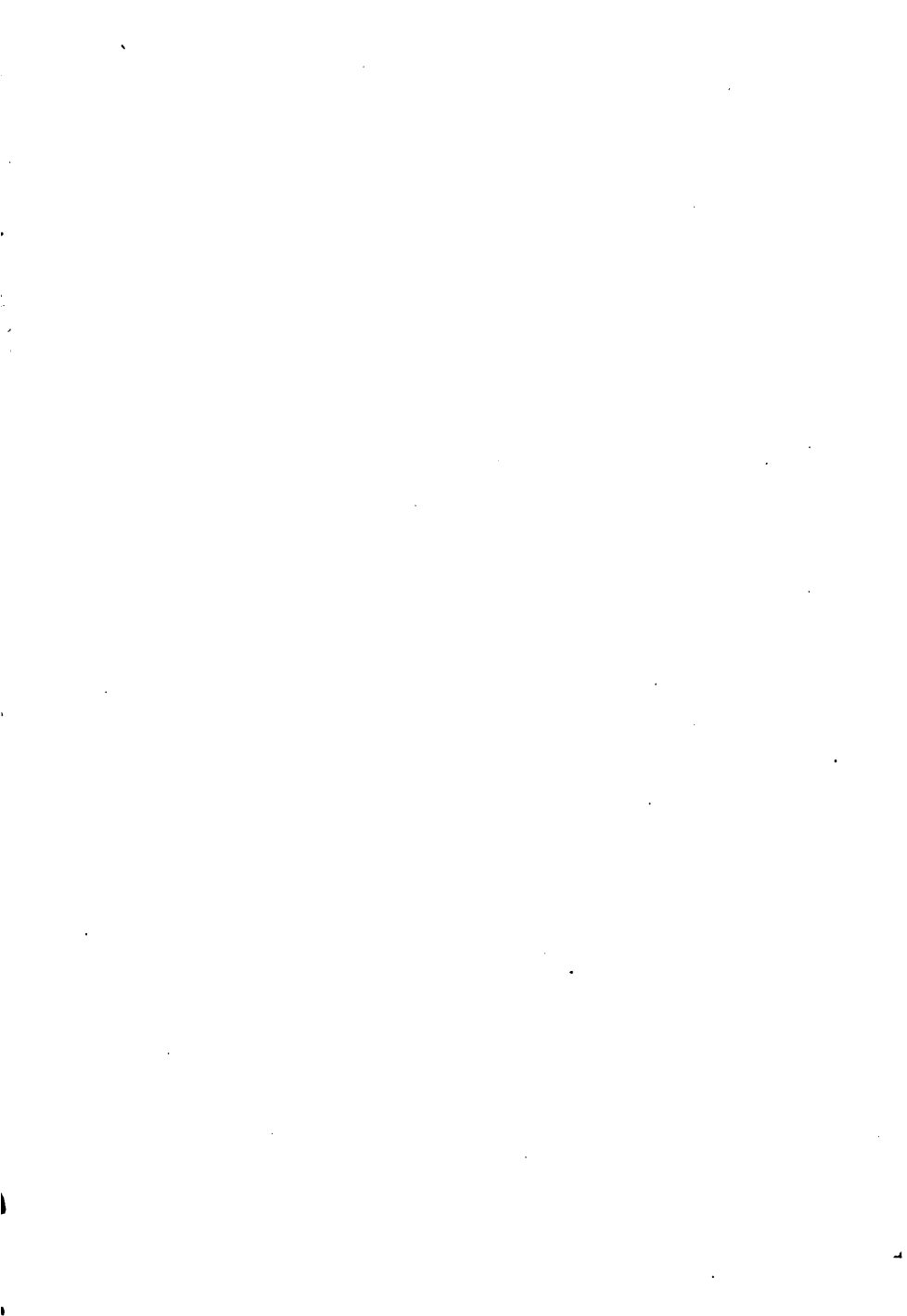
The camera has decided many important lawsuits. Its evidence is accepted, as a rule, as unprejudiced and incorruptible. It is only of late, however, that the moving picture camera has found its way into the court-room. A unique piece of movie evidence was introduced

## THE CAMERA MAN

recently in a trial for damages following a fatal automobile smash-up. The collision occurred as a crowded car crossed the track, and the decision involving a large sum of money rested on the claim that the occupants of the car could not see the track and the approaching train until it was too late. The lawyer for the defense hit upon the ingenious scheme of making a moving picture film from an automobile as it approached the crossing which clearly showed the approaching train, and the jury was instantly convinced.

In carrying forward a great engineering work in a city where accidents and consequently damage claims threaten, complete photographic records are often made and filed against a possible accident. During the digging of the subway beneath a busy New York street it was necessary to short up, or buttress, the foundations of hundreds of buildings. Many of these buildings were skyscrapers and a great variety of complicated problems were encountered. Hundreds of photographic studies were made by flashlight, often far underground, which formed a complete panoramic view of the subterranean street.

The camera is carried into the deepest mines





A traveling movie theatre for instructing railroad employees



A railroad wreck made to order



## COMMERCIAL PHOTOGRAPHY

and proves invaluable to mining engineers. Flashlight pictures are virtually out of the question in mines, since the supply of oxygen is at best limited and cannot be wasted in this way. Excellent moving pictures have nevertheless been taken by electric light several hundred feet below the surface. The engineers gain an accurate idea in this way of the value of supports and timber work in general, while an actual "close up" will prove the existence and extent of all kinds of ore deposits.

In constructive engineering work the moving-picture film is often of invaluable assistance to the draughtsman. A bridge builder, for instance, will employ a moving-picture man to photograph the actual work of construction and will preserve and consult these films in future as carefully as any mechanical drawing. From the picture which shows the girders and other parts being lowered into place and attached, as well as other details of construction, the engineer learns facts about strains and the supporting strength of his foundations which no drawing or calculation could possibly give. His eye might deceive him, but the camera is impartial and accurate.

It was found necessary recently to replace a

## THE CAMERA MAN

large bridge on a western railway while the heavy traffic constantly crossing made the question of time highly important. The old structure was removed and the new bridge put in place in less than three days. The moving-picture film caught the last train crossing and the cutting away of the old bridge by means of acetylene torches, the discarded girders and supports being removed and the new bridge as it was lowered into position. The film closed with a view of the first train passing over the new structure. The work of three days was depicted very clearly in a film which could be run off in half an hour.

Many of the large manufacturers of machinery throughout the country have organized elaborate photographic departments which prepare a photographic record of their work. In the largest locomotive works in the country, for instance, several photographers are employed to picture in detail every piece of machinery which goes out of the works.

A locomotive is photographed from several points of view and every detail of its mechanism is thus recorded. The elaborate records prepared in this way are found to be a valuable supplement to the regular mechanical draw-

## COMMERCIAL PHOTOGRAPHY

ings. In recent years the moving-picture camera has been commonly used in preserving these records. A film is prepared of a piece of machinery in actual operation which will preserve information that the most detailed mechanical drawing will necessarily miss.

The moving-picture camera again is in many respects the best salesman in the world. It tells the truth and nothing but the truth about a great variety of objects much more quickly and satisfactorily than the most voluble salesman. If a new piece of machinery is to be demonstrated, or any one of a hundred salable objects, a good clear film will explain its merits quickly and definitely.

Many firms now prepare moving-picture films of the wares they wish to sell, which are run off for the benefit of the possible customer. The films may be shipped cheaply and repeated many hundreds of times. Many salesmen use them to illustrate their arguments to customers. It is prophesied by experts that a revolution in the methods of selling goods will soon be worked by the more general introduction of the moving films.

In the past few months the moving-picture camera has revolutionized the methods of ad-

## THE CAMERA MAN

vertising gowns and wearing apparel, or "fashion stuff," as it is commonly called. It is only a short time since a dress had to be pictured in a simple line drawing which gave little more than an outline. The ordinary still photograph and half-tone picture improved upon these drawings, but it is only since the introduction of the movies that the fashion picture has become a fine art.

A gown or wrap, a set of furs, or a hat is worn by a model who is shown in an appropriate setting. Great pains are taken to have the picture complete in every detail. A ball gown is worn in a ballroom, or several models meet naturally in the lobby of a theater. To picture a riding habit the model mounts a horse and rides away. A yachting costume is posed on the deck of a yacht. A fur coat is worn by another model who steps in or out of an automobile on Fifth Avenue before the movie camera. An immense industry has been built up in this way. In hundreds of small cities or towns, the fashionable dressmaker who cannot afford to display living models buys tickets for the moving-picture theater where the fashions are shown and distributes these among his customers.



An interesting problem in sea salvage



Wreck photographs are often valuable in settling the salvage



## COMMERCIAL PHOTOGRAPHY

General use is made of the news photograph again for display advertising. In tens of thousands of store windows the country over are displayed placards containing striking photographs or "live" news events. The latest pictures of the war, or some spirited snap-shot of a public event such as a fire, which is in the public mind, can be counted upon to catch the eye of the passer-by. Such pictures are collected and distributed in immense quantities. In some cases they are renewed weekly, or even daily, often rivaling the newspapers in their freshness and the liveliness of their appeal. The wares of the camera man thus find an entirely new and very extended market.

In preparing advertising literature, photographs are often collected from the ends of the earth. A booklet which advertises diamonds, for example, is illustrated with excellent photographs illustrating the diamond industry in detail. There will be pictures of the mines, perhaps in Africa, and many views illustrating the work of cutting and preparation. An advertising booklet for a particular brand of rope will contain an attractive description of the entire hemp industry. The furrier will secure actual photographs taken by the traders

## THE CAMERA MAN

in remote Arctic regions, showing the wild animals in their native haunts, and the primitive trading outposts in the far North. Such literature has of course a considerable educational value.



## CHAPTER VIII

### GOVERNMENT WORK

**H**E was carrying a movie camera and other bulky baggage in the crowd hurrying trainward. At any news event about New York this particular camera man is always early on the scene, and we drew the natural conclusion.

"Where are you bound?" we hailed. "What are you after now?" The camera man shifted his heavy outfit to the other shoulder.

"Wyoming," he explained briefly. "Government work. Sheep stuff." And he disappeared down the station platform.

Some weeks later our friend, a well-known camera man named Whipple, dropped in to tell about his trip and show us some of his films. On an hour's notice he had been rushed out West on an elaborate government film, illustrating the wool industry. The film was to begin with some artistic scenes of sheep grazing in Wyoming with the snow-capped Rockies in

## THE CAMERA MAN

the background. The morning we met our friend he was hurrying to catch a train which would take him to Wyoming before the snows disappeared. He had caught the snow and the sheep in many beautiful pictures.

The film which ran to six reels illustrated the wool industry in all its stages. The camera man was obliged to make other journeys for scenes of the shearing, the cleaning, and carding of the wool. Several scenes for this film were made in factories in Connecticut. An unusual problem was encountered in this work which illustrates the difficulties and hazards which beset the moving-picture operator even in taking so conventional a subject as "sheep stuff." It was necessary to take the spinning machines in a Connecticut mill, but the floor was so crowded with machinery that there was no room to set up the camera. Whipple was equal to the occasion and designed a platform or frame to be constructed outside a window on which he could set the camera and balance himself while taking the pictures of the interior. It chanced that the window was eight floors up, and the camera man was obliged to stand on a projecting beam at this dizzy height and calmly focus and grind his camera.

## GOVERNMENT WORK

The Government employs an experienced moving-picture operator of the Department of the Interior who devotes all his time to making films. In the course of a year his "take" frequently runs into tens of thousands of feet of film. He visits all parts of the country and works at every season of the year. For some time he has been at work on a collection of movie studies of our national parks. The films preserve famous scenes in the Yellowstone, the Grand Canyon, etc., with detailed pictures or "close ups" of their natural wonders. The geysers have been photographed in action, and the wild game shown in its natural haunts.

The official films have proved especially valuable to the Government in carrying on great irrigation projects in the West. The moving picture operator goes over the ground very carefully, preparing films of the streams, or other sources of water supply. Such pictures will show the exact nature of the country more vividly than any writing or drawing.

The actual scene of operations can thus be presented to the engineers and officials at Washington. As the engineering work progresses, records are made at regular intervals and the authorities at the Capitol are able to

## THE CAMERA MAN

watch the operations carried forward thousands of miles away but virtually before their eyes. The film which begins with scenes of arid lands shows finally the same country plentifully supplied with water and growing flourishing crops.

The movies have proved especially valuable to the Government in its forestry work. Films have been made of the giant redwood trees of California, as well as of trees of many varieties throughout the country. The detailed pictures make very interesting studies and become matters of official record. "Close ups" are made of parts of trees affected by various diseases, which are of great assistance to the experts in diagnosing these ills and prescribing for them. The various worms and insects which attack trees are also photographed, in some cases under the microscope.

An important educational work is being done by these films again in connection with the Forestry Reserve. The danger of forest fires, for instance, is made very real by actual moving pictures of great conflagrations. The alert news picture men have caught many thrilling forest fire pictures. By venturing far into the burning woods, films have been secured of

## GOVERNMENT WORK

great sheets of flame sweeping over acres of tree tops, and of the settlements in the paths of these fires being literally wiped out before one's eyes. This actual "fire stuff" has been used as the basis of elaborate government films which tell a complete story of the disasters.

A camping party is shown in the woods, which carelessly leaves the camp fire burning. The fire slowly spreads, eating deep into the forest before it is discovered. The alarm is given, and the regular organized government forest fighters are seen rushing to the scene with their water packs and other apparatus strapped to their shoulders. Thrilling scenes of fire fighting, in which scores of men work desperately to check the flames, follow. The flames reach a village, and the entire population works in vain to save the houses in their path. The smoking ruins and the desolation of great tracts of land complete the picture.

Fully a year was spent in collecting material for another government film, illustrating the work of the Fisheries Commission. The scenes were widely separated, some being taken in Washington, others on the Columbia River in Oregon. The work in the fish hatcheries is shown in many "close ups." Millions of eggs

## THE CAMERA MAN

are collected and prepared for shipment. In a flash the scene shifts to some remote river which is being stocked, while the next scene shows the fish fully grown months later. The camera man has journeyed to Alaska to catch Arctic scenes and to Hawaii and the Philippines to complete these films. Copies of all these are of course preserved at Washington, while prints are exhibited to millions of people in the theaters throughout the country.

A moving-picture camera is almost always a part of the equipment of the government expeditions for exploring new lands. In the ethnological work the films secured are often the most valuable results of the expeditions. A trip of this kind will sometimes cover two or three years. If a study is to be made, for instance, of the life of Indians or the natives in remote parts of the Philippines, the moving pictures preserve an actual living record.

Such pictures have proved invaluable in studying the harbors and channels. The new diving bell for taking deep sea movies, which has been mentioned elsewhere, makes it possible to photograph the floor of the ocean or the beds of rivers and harbors. The lighthouse and the life-saving service have also been rendered



Ex-President Roosevelt and Mr. John Muir in the Yellowstone National Park





## GOVERNMENT WORK

more efficient than ever before with the aid of the moving-picture camera.

The Government is, as a rule, very friendly to the camera man. A close guard is set, to be sure, about our coast forts and parts of the navy yards and other government properties where the camera might intrude on official secrets, as an unscrupulous moving-picture operator could be a very dangerous spy. In virtually all departments, however, every encouragement is lent to the photographer.

Official permission to take photographs either of still pictures or movies is, as a rule, readily obtained and the camera man is assisted in every way. As a return for these official courtesies the Government only asks for one copy of every picture made, which is duly classified and filed in the archives at Washington. In moving-picture work this means a complete film. There are at present upwards of half a million feet of film preserved in this way.

The readiness of the Government to hold out a helping hand to the camera man was well illustrated during a recent trial of a great battleship. The photographer had been assigned to get a bow-on view of the ship as she approached at top speed, and had gone out in a

## THE CAMERA MAN

launch with the idea of crossing her bow, a sufficiently perilous undertaking. He very nearly lost his life, but the picture he caught of the towering ship rushing upon him, with her great bow wave and the clouds of dense smoke in her wake is perhaps the best photograph of its kind ever made.

The alert officers on the bridge of the oncoming battle ship sighted the photographer's launch, and fearing that she would be run down or capsized by the following wave ordered a boat to be manned and swung outboard ready to pick him up. All this was the work of perhaps thirty seconds, and admirably proves the alertness and the friendliness of the man on the bridge. The camera boat got out of the way just in time and managed to live in the wake churned up by the powerful propellers.

The camera man is often the guest of the Navy on the trial runs of the new ships, where he is given every assistance to make the photographic history of the run complete. Doubtless the most spirited picture ever made of a battle ship in action was taken recently from the fighting top of a great skeleton mast. Before the broadsides began, the camera man, carrying a heavy moving-picture outfit, climbed

## GOVERNMENT WORK

to the cage atop the towering mast, more than one hundred and fifty feet above the deck. It is only on our American ships of war that this unique view can be obtained, since no other navy has as yet adopted the skeleton masts.

The camera was pointed almost directly downward and lashed fast, a very necessary precaution. The film showed the crew, at the call to quarters, rushing about the deck far below, and making everything ship shape preparatory to "going into action." The entire ship's deck lay below the camera like an architect's drawing. When the great guns "spoke," the blinding flashes of fire were clearly caught, and a moment later the dense clouds of smoke which spread out on every side far over the sea.

The camera man, Mr. Lawrence Darmour, who made this remarkable film, described his experience to the writer.

"It was n't the height or the general confusion that bothered me," he said. "I could grind away at the picture all right, except when the biggest guns went off. The concussion so near at hand was terrific and for just a moment stopped me dead. Try as I would, my hand would stop turning at the shock. It was only

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for a fraction of a second, but later when the pictures were developed and thrown on the screen you could notice a slight jump just at the moment the flames shot out of the gun.

"Try as I would the explosion brought my muscles to a dead stop. I could not see that my hand stopped turning, but the camera felt it and the film showed it all right."

The same experience has been observed by moving-picture operators many times at the moment of a violent explosion or other sudden shock.

A special camera has been invented which works much faster than any ordinary moving-picture apparatus and serves to catch a shell as it leaves the mouth of the cannon. In this camera the pictures are taken automatically, and the human element is removed. The fastest of the movie cameras of the familiar type will take some sixteen pictures a second. The new apparatus takes about one hundred pictures a second with mathematical accuracy.

No mechanism can be devised which will work quickly enough to do the work. The shutter of the lens could not be operated at such speed. The exposures are made by an electric

## GOVERNMENT WORK

spark. The new apparatus makes it possible to analyze motion so swift that no human eye could possibly detect it. The more quickly a motion picture is taken, by the way, the slower it appears when screened.

A film, taken with this camera, of a horse jumping a hurdle for instance, when thrown on the screen, reproduces the action to the last detail, but the horse moves very slowly through the air apparently defying every law of gravitation. Until instantaneous photographs were taken we had a very unscientific knowledge of action. Paintings of horses in action, even the most famous ones, were sometimes absurdly wrong. A new and interesting field of scientific investigation has been opened by these new instantaneous studies.

An official film of every naval ship is filed in the government archives at Washington. It has been found that the best possible place the country over to catch these pictures is from the Brooklyn Bridge in New York. A special platform has been constructed at the extreme edge where the view is uninterrupted. The camera man is often strapped in so that he can lean far out at this dizzy height and photograph the ship as it passes directly beneath him.

## THE CAMERA MAN

From this point of view every line of the ship is revealed.

In these official movie archives at Washington are filed many films of very human interest. Special studies are kept, for instance, of the appearance and mannerisms of the Presidents. The films show the Presidents walking, greeting people, delivering addresses, and presiding at official functions, all realistically recorded in many thousands of feet of film.

Since these records may be preserved indefinitely, a history of absorbing interest is thus being prepared for future generations. In centuries to come these living pictures of our Presidents wearing what will then probably appear quaint and outlandish costumes, will make the history of the past very real. Could such a record have been preserved of the past, with what interest we would now watch Washington delivering his farewell address, or Lincoln reading his immortal Gettysburg oration!

The movies have been seized upon by both the Army and Navy recently to serve as a drill officer in licking raw recruits into shape. The Government finds it difficult to find drill officers of the regular army to instruct civilians. It is possible that a situation might arise where

## GOVERNMENT WORK

the supply would prove entirely inadequate to the demand. A series of films have been made at the Military Academy at West Point illustrating the manual of arms.

The cadets have been posed for the movie camera, showing the proper methods of executing setting-up exercises, the manual of arms, squad drill, the use of the bayonet, the mechanism of the army rifle, and the use of first-aid equipment. Many of these pictures are "close ups," which show every detail of the operation. A photograph is used to supplement the pictures, which gives the proper word of command at the right moment with the correct inflection. The pictures may, of course, be run again and again, or slowed down, or stopped at any point to illustrate a detail of the drill. These pictures make it possible to drill large numbers of men in widely separated parts of the country. They assure a uniform training so that men, modeling their drill from these films in Maine and California, could afterwards drill together without readjustment or loss of time.

Practically all the government departments are supplied with laboratories for photographic work under the direction of expert camera men. The most elaborate is that of the Department

## THE CAMERA MAN

of the Interior which employs ten men. An immense volume of work is also turned out in connection with the patents. The Geological Survey is largely dependent upon the work of camera men, as is of course the Department of Agriculture. A number of camera men are regularly enlisted in the Navy. In the War Department the work of the camera men is especially confidential and is closely guarded. The reports of secret service men, such as the drawings of fortifications and army plans and a thousand private papers, are copied in the special laboratory of the Department. In some cases the government work is finished by commercial camera men. Of all the government work, some 90 per cent. consists of still pictures and 10 per cent. of moving pictures.



## CHAPTER IX

### ON LOCATION

**T**HE camera man bears a charmed life. He must be very near the action of every movie "thriller." As one watches the pictures flash past, it is a common experience to feel so near the danger zone that we involuntarily shrink away from it. An onrush of cavalry which seems to dart aside at the moment it is overwhelming us, a made-to-order railroad wreck which threatens to tumble upon our heads, and a score of similar pictures give us this sense of peril, which is at times so real as to be painful.

Now the camera man must have stood his ground in all these dramas, and have felt the thrill of danger at first hand. A miscue, however trifling, in staging the action might mean a fatal accident. In the early days of motion-picture dramas these accidents were often "faked" by smashing up miniature properties. The trains which came together and crumpled

## THE CAMERA MAN

under the impact perhaps measured two or three feet in length, and an ingenious close-up view exaggerated every detail. The average moving-picture audience is much too wise to-day to accept any such forgery, and the camera man must of course be in the very thick of it to catch realistic close-ups. In a well-known movie drama, for instance, a train, a real one though empty, crashes through a bridge and falls many feet into a raging river. The man who operated the camera was obliged to stand perilously near the falling bridge and the next two hours were spent in the water amid the floating débris, filming close-ups of the rescue.

In the days before the movies, the wild animal parts in any drama were played by human actors in ingenious make-ups or by property animals. No one would, of course, turn a dangerous animal loose on any stage. The movies have changed all this, and to-day every animal in the menagerie is cast for the movie plays and often appears before the camera in life. A menagerie of one hundred and fifty animals, rivaling Noah's ark for variety, is maintained in Los Angeles to supply suitable animal actors for every conceivable rôle.

## ON LOCATION

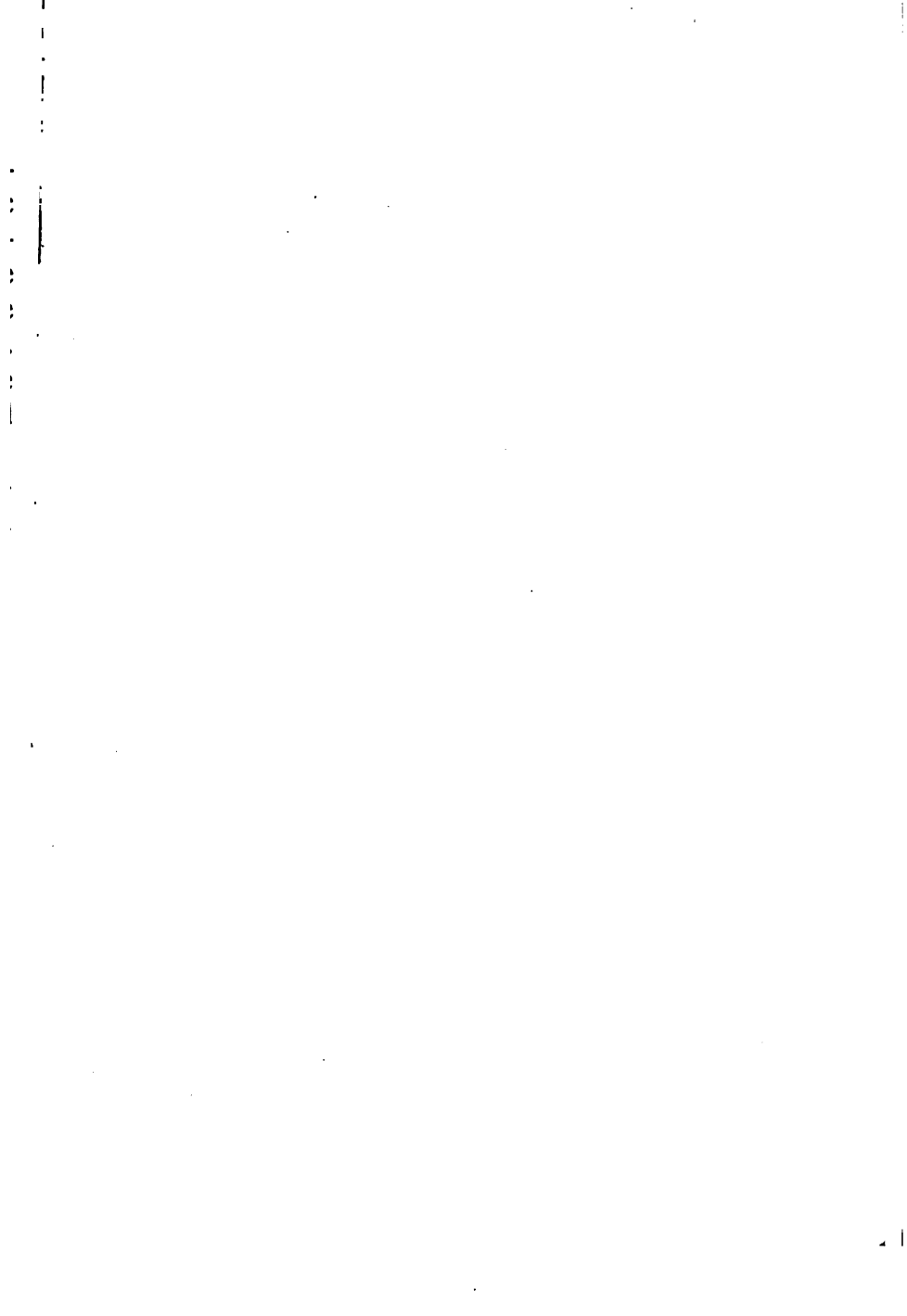
When the beautiful heroine is cast to the lions in a moving-picture drama, she actually enters a cage of living lions, and when the hero struggles with a tiger in some movie thriller he actually faces a lively danger.

The camera man shares these dangers. He must grind his camera in many close-ups when the animals with a single spring might reach him. These dramas are often played inside cages where the position of the actors and the camera man are doubly perilous. Every precaution is taken to have the animal actors in a good humor. The pictures are usually taken just after feeding time, when the animal stars are supposed to be in a favorable mood. They are under the care, of course, of experienced trainers. The danger, nevertheless, is very real. As a precaution, several men armed with heavy rifles usually stand close by, so that at the first sign of danger they would make short work of the beast. The action of the play often requires the actors to grapple with the wild animals, or fall beneath them, and the fear which they are told to "register" for the picture's sake may well be unfeigned. To the camera man these close-ups are, of course, all in the day's work.

## THE CAMERA MAN

Despite every precaution in staging the thrillers something may go wrong and the mimic accident become a real tragedy. In California, where so many daring movie feats are photographed, elaborate plans were once made to film an actual battle between two aëroplanes. Every detail had been worked out in advance and although the battle was perilous, as all flying must be, the risk did not seem extreme. A stout wire was strung between two mountain peaks crossing a deep valley, and from this was suspended a dummy aëroplane complete in every detail except for the motor and pilot. The air craft could be made to slide smoothly and rapidly along this wire by the simple device of pulling it across the ravine. Since the wire on which it slid and the one used for pulling were invisible the flight would appear perfectly natural in the pictures.

When all was ready a second aëroplane, this time a real one, rose at some distance and flew directly over the dummy machine. At the moment it was directly above the dummy a bomb was to be dropped which would blow the aëroplane beneath to pieces and set fire to the fragments. The final signal was given, and the dummy machine was slid smoothly and swiftly





A daring automobile feat for the movies

## ON LOCATION

along its wire. The real aëroplane approached flying steadily, but by a miscalculation did not pass directly over the dummy machine. The pilot was obliged to make a wide detour, turn his craft, and return at a lower level. He reached a position just above the dummy and the bomb was dropped. A moment later the force of the explosion threw the end of his aëroplane up, and before he could right himself the machine shot down from this dizzy height, striking the ground far below with fatal results.

One of the most spectacular accidents in a business in which daring feats are an everyday affair occurred on the Hackensack Meadows near New York in the staging of a movie thriller. A giant sky-rocket had been constructed, powerful enough to carry a man aloft. An immense charge of powder was employed to send the rocket skyward. The passenger took his seat ready for the flight, and several camera men were disposed at advantageous view-points. It was planned to film the flight of the rocket from first to last. On reaching its altitude the passenger, who was an expert in the business, was to unfold his parachute and descend, it was hoped, in safety to the

## THE CAMERA MAN

earth. By a mistake in calculation the rocket refused to rise, and the explosion which wrecked everything in the vicinity nearly killed the movie actor and the camera man.

The most realistic fire picture ever taken by a man who lived to tell the tale and develop his films, was a remarkable, made-to-order conflagration in New Jersey. A massive vault had been constructed of steel and concrete for the purpose. It consisted of a large concrete chamber with a single opening at the front. Experts were brought from the New York Fire Department to decide how large the hole should be in order to supply sufficient oxygen and allow the flame to escape. In this vault was placed about one million feet of discarded moving-picture film, which is highly inflammable. The fire was started from a safe distance by means of an electric spark.

The camera man set up his machine forty feet away from the opening from which the flames would shoot and thirty feet off the path the flames would take from the mouth of the vault. The fire surpassed the fondest hopes of the moving-picture people. The one million feet of films caught fire with great explosive force, and a tongue of flame shot from the open



## ON LOCATION

mouth of the vault and instantly set fire to a fence eighty feet away, which was supposed to be entirely out of danger. The grass for more than a hundred feet was burnt to a crisp. Although the camera man was thirty feet to the side of the path of this flame, his camera was badly blistered to say nothing of his hands and face. He filmed the first onrush of the flames, and then catching up his camera ran literally for his life about thirty feet and here stood his ground to the last. No one can watch the film on the screen without involuntarily dodging in his seat as the great flame leaps toward one.

In these made-to-order fires the camera man often faces a greater danger than the news photographer in covering an ordinary conflagration. He particularly dreads, and with reason, a picture showing the inside of a burning house. A frame room is usually constructed for the fire pictures far out in some field, so that the flames may not spread. If the heroine is to be rescued the room is actually set on fire and plenty of combustible material is left about to feed the flames.

To catch this close up the camera man may have to set up his camera with the lens looking

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through the window. In many pictures the flames spread quickly to the walls and window frame, and the temperature in the vicinity of the camera rises rapidly. To retreat before the action has been completed and the heroine has been rescued would be to miss a picture which may have cost a considerable sum to stage. Bonfires are expensive. The camera men have stuck to their posts around pictures when it was necessary for some one to throw water on the camera and the operator to prevent their catching fire.

During the actual taking of any picture the camera man must be a part of the machine and callous to all emotions. The staging of a moving-picture drama may cost a fortune and the action may be such that it is impossible to repeat it. The failure of the camera man would make it necessary to repeat months of work of preparation. The camera man is not expected to have nerves or to be affected in the slightest by the scene, no matter how thrilling it may be. He must keep on grinding his film come what may. The same rule applies, of course, to the actors.

A scene where hundreds of people are employed is often at the mercy of some trifling ac-

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cident. An elaborate execution scene was once staged near New York which came to grief through a very small matter. A scaffold had been built at the turn in a roadway which offered the proper setting. The mob had been carefully drilled and several hundred supers stood before the platform, registering anxiety as they gazed at the "doomed" man. Everything was working well. Several hundred feet of film had been taken when the drop fell and a dummy figure dangled realistically at the end of the rope. At this most inopportune moment an automobile with several ladies dashed suddenly around the corner of the road. The ladies, brought face to face with so gruesome a scene, screamed in chorus. The actors instantly turned about to see the excitement. The motorists saw their mistake and sped on without a word, but the picture was ruined.

"What would the movies do," some one has asked, "without the automobile?" In hundreds of film dramas the motor car plays every day a wide variety of rôles. When automobiles were a novelty an audience was interested merely to watch them carrying the hero or heroine about in the conventional manner. It has become necessary, however, to invent new

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and surprising uses for automobiles to hold the moving-picture patrons' interest.

In a recent film drama a very thrilling effect has been obtained by having a large touring car jump a deep and apparently wide chasm. As a matter of fact the jump measures actually about forty feet. By skilfully placing the motion-picture camera below the jumping-off place the distance appears much greater. The car is supposed to leap from a broken bridge. The bridge, which served as a spring-board, was constructed with scientific accuracy with the exposed end, or take-off, elevated at just the right angle.

A stout car was selected for the purpose and special engines installed which would drive her fast enough to make the jump. It was calculated that the automobile traveled at the rate of one hundred and ten miles an hour when the leap was made. The car had to be guided by an experienced, as well as daring, chauffeur. The three other figures in the car were dummies which made just as good an appearance before the camera as real persons and saved needless exposure to danger.

When all was ready the car started about a mile down the road which was of course per-

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fectly smooth and straight, and approached the gap at great speed. Gathering momentum as it approached the bridge, the car covered the last few hundred yards at a rate of nearly two miles per minute. The camera man held his breath, but continued to grind his machine as the car struck the fragment of bridge with a resounding crash and leaped into the air, coming down safely on all four wheels a fraction of a second later, on the opposite side of the ravine.

## CHAPTER X

### SCIENTIFIC RESEARCH

**A** FASCINATING field of investigation has been made possible by the new system of photographing with extremely rapid exposures. The ordinary moving-picture machine cannot be worked fast enough to catch the flight of a bullet, or the movement of the wing of a fly. There are probably thousands of movements in nature which have never been seen because of their extreme swiftness. To film the more rapid action it would be necessary to take five thousand pictures per second and no mechanism could be devised which would stand the strain even for the fiftieth of a second.

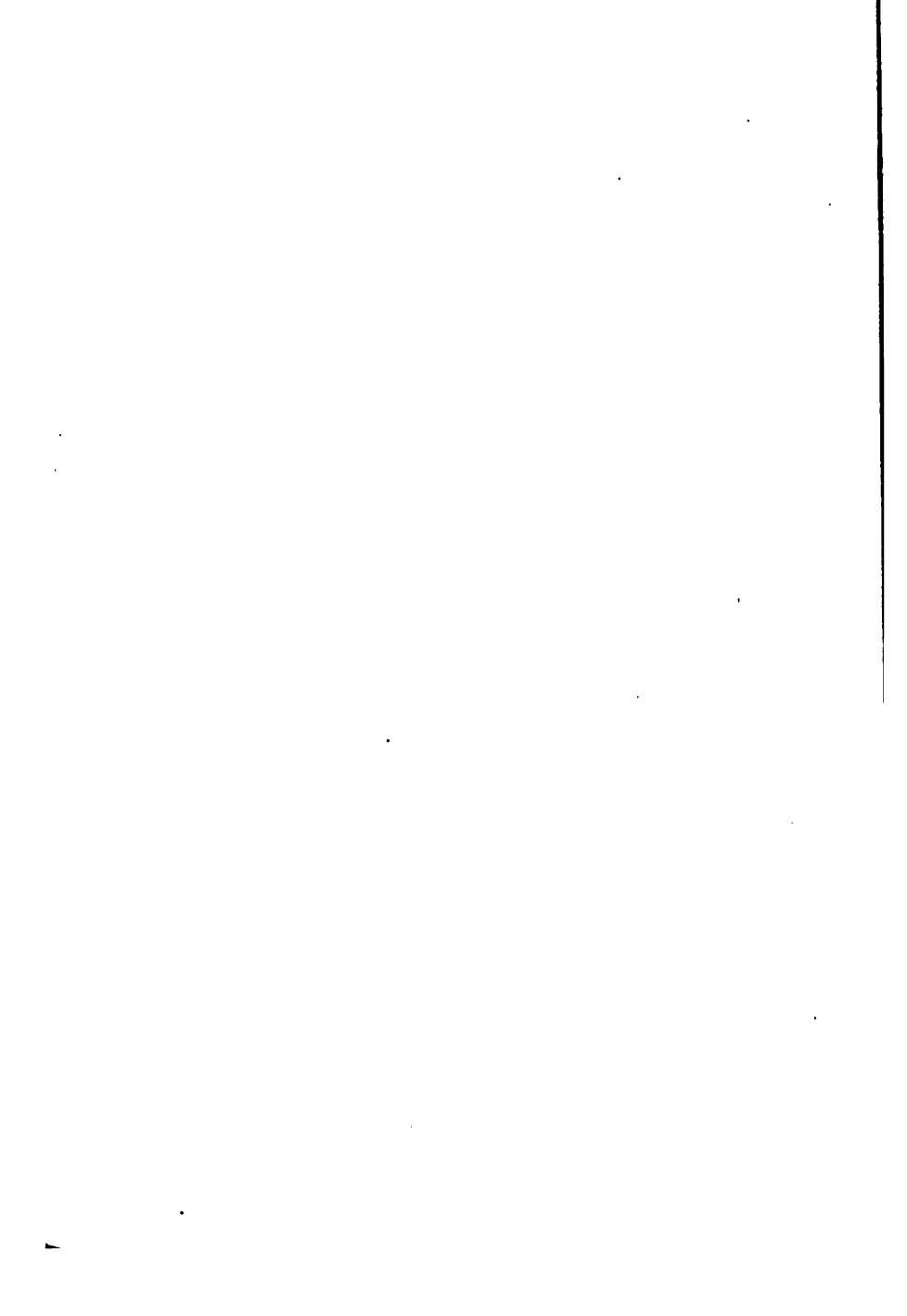
Some remarkable scientific experiments have been carried on in France and Germany to take movies fast enough to be of use in scientific research. A picture has been taken in Germany in one ten-millionth part of a second. The question naturally suggests itself how so



An early amateur photograph taken in 1865



Completion of the first American Transcontinental Railroad





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small a fraction of time may be measured. No time-piece, however delicate, would answer. The difficulty has been overcome by placing a tuning fork in range and measuring the exposure by the distance it has moved in two pictures while certain notes are sounded. The fork, of course, vibrates at very high speed.

The fastest moving-picture machine at present takes pictures at the rate of two thousand per second. The ordinary moving picture reproduces only a fraction of the action. The lens takes some sixteen pictures a second, but the interval between these exposures is skipped. A considerable proportion of the action, in other words, is not photographed and remains a mystery. In filming a motion-picture drama this loss means nothing, but in scientific research the film would be incomplete. The scientific moving pictures taken at the rate of two thousand to the second naturally miss very little of the action. The camera man operating a machine of this kind shows us many wonders of nature which the human eye has never looked upon. As time goes on the work of the extremely rapid-fire movie may prove no less important than that of the microscope, or the telescope.

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One of the most rapid movements in nature is the beat of a bee's wing. A picture taken in a sixteenth of a second, as in the ordinary movie, misses it completely, and even an exposure of one two-hundredth of a second has proved too slow. One of the new scientific moving-picture machines, in which the picture was taken by an electric spark in an infinitesimal period of time, has secured for the first time a sharply defined picture of a bee in flight.

A bee was launched almost upside down before the camera, and the film shows its efforts to right itself. The bee regained its equilibrium so quickly that no eye could possibly have followed its movements. The final exposure of the film showed the bee right side up and making a "bee line" for safety. The entire operation was performed in one hundredth of a second, during which period twenty sharply focussed pictures were taken. By studying this film, much that was new was learned of the bee's method of flight, which may some day have a highly important application. It is conceivable that the flying machine of the future may be constructed, or operated, on some entirely new principle discovered by the scientific camera man.

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When these films are thrown upon the screen they are, of course, slowed down. To catch a clearly defined picture of a bullet leaving a rifle it might be necessary to operate the camera at the rate of two thousand exposures to the second, but if the film were projected at this speed it would be invisible to the eye. The picture is shown at the same rate used in ordinary moving-picture work, or about sixteen to the second. The film of the rifle bullet would then be clear, but the bullet would travel across the screen at a snail's pace. When the bee film is projected, the wings appear to flap as lazily as those of a very deliberate chicken when stretching itself.

The flight of a bee is a synonym for directness and expedition. Hunters of wild honey, knowing that the bee describes a perfectly straight line in its flight to its hive, lie in wait and once they catch sight of the bee and notice its direction, it is only necessary to follow in a straight line to reach the stored honey. A compass is sometimes used in the search. The new movies show just how this marvelous, straight flight is made.

No matter how rapidly a motion picture may be filmed, the fact still remains that the pictures

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are taken intermittently and something of the motion is lost, just as the eye is closed for a minute fraction of time when a person winks, and misses whatever is going on during that period. In ordinary motion-picture work the lens is closed for one thirty-second of a second between exposures, or about half the time. What happens while the lens is closed? The motion-picture camera has been put to many uses where it is of vital importance that there should be an unbroken record, a continuous movement, and the picture may be rendered quite useless because of this "blinking."

In recording the movement of a piston, for instance, it is essential that the continuous action be caught, or the record is valueless. Should the piston be traveling at the rate of eight thousand feet per minute, as is often the case, a motion-picture camera making sixteen exposures to the second would catch a very small part of the action. To overcome this difficulty a camera has been devised which takes a continuous moving picture. The revolving shutter and intermittent movement of the film is done away with. The lens is left open during the exposure.

The continuous system is employed in a sur-

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prising variety of ways. A physician may thus secure a continuous record of the pulse and heart movement of a patient throughout an illness. The physician can tell much more definitely how the patient responds to his treatment than when the pulse is taken only at intervals. The sounds of the heart beat are also reproduced on sensitized paper in a continuous record. In making these the camera works in connection with a stethoscope placed over the patient's heart. A permanent and absolutely reliable record is thus preserved, which is invaluable in diagnosing and prescribing for the case.

Many uses have been found for the continuous photograph in medicine. An interesting study may be made by attaching a small electric lamp to the hand and performing some familiar operation before the camera. The picture is made by merely focussing an ordinary camera in a dark room and opening the lens. Since the hand or arms moves continuously it will be hopelessly blurred, but the electric light will describe a continuous ribbon of light which the plates catch distinctly. By examining such a photograph with a magnifying glass every movement may be clearly traced.

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Perhaps the most novel of these experiments was made by a physician who attached small electric lamps to the head, shoulders, and other parts of the body of a patient suffering from rheumatism, and had him walk before a camera in a dark room. The plate recorded faithfully the paths of light described by the lamps. This unique record showed at a glance the difficulty the patient experienced in walking and proved of great scientific value. Similar photographs taken as the patient improved showed the ribbons of light gradually approaching to straight lines indicating that the limp and other contortions were greatly reduced. The continuous photograph is extensively used in testing physical, chemical, and electrical phenomena.

An even more fascinating study than the slowing down of very rapid movements is the speeding up of the very deliberate movements in nature. A moving picture may be taken which will show in a few minutes a growth which has required several weeks or months. Thanks to the patience and ingenuity of the camera man we may watch a seed swell and sprout before our eyes. The tiny thread develops steadily, branches out in leaves, and fi-

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nally flower buds appear and unfold without the motion once being arrested. A film which may be run off on the screen in a minute or two may have taken a month to prepare. It is interesting to calculate that we have seen the entire operation of germination in something like one fifty-thousandth of the time required for the actual growth, and have missed no detail of the development.

This is one of the most fascinating employments in the entire range of photographic reproduction. To produce such a film, which will unroll steadily without any hitch or interruption, it is necessary to photograph a subject at regular intervals continuously day and night throughout the entire operation. Where the growth is very slow, as in photographing a grain of wheat, it may be necessary to make an exposure every ninety seconds throughout the entire period. This is usually done by operating the shutter of the camera by a clock work device.

It is necessary to watch the growth very closely at times, since the grain of wheat might burst open unexpectedly and the exposures for a time would have to be made more frequently. Such pictures amply repay the camera man for

## THE CAMERA MAN

all his patience. They can be made with cheap outfits and often bring a very high price. Films showing movements of a flower are often very beautiful when thus speeded up.

A new chapter was opened in medical research when the motion-picture camera was linked with the x-ray apparatus. The difficulties for a time appeared insurmountable, but a Frenchman who is also an expert chemist and a scientist has devised a complicated mechanism which makes it possible to take pictures through solid substances at the rate of sixty to the minute. Valuable pictures have been made of the actual process of digestion of many animals, fish, birds, chickens, lizards, frogs, and mice.

To secure sharp pictures the subjects must, of course, be immovable and wonderful ingenuity is shown in posing them before the camera. A chicken is held in a plaster cast, while a fish is placed in a celluloid envelope with a continuous stream of water passing through it during the exposure.

The camera man must wear what amounts to a suit of armor consisting of lead aprons to protect himself from the dangerous x-rays during these long exposures.



## SCIENTIFIC RESEARCH

When such a film is screened one may watch many interesting details of the digestive process. A great advance in the study of digestive processes was made years ago when a physician by a lucky accident was able to look through an incision into the stomach of a living man. The man with a "side door to his stomach" is famous in medical history.

The value of the x-ray photograph or image has been increased by the use of the stereopticon method. There is no perspective in the ordinary x-ray picture and the objects seem to lie upon the same plane. A photograph made of a bone which has been thrown out of its socket would not show whether the bone were in front of, or behind, the socket bone. The stereopticon taken by the familiar process shows at a glance the objects in their proper relation.

With the aid of powerful microscopes the camera man has been able recently to make continuous pictures of the life of an amazing variety of bacteria and microbes. So successful is this new photography that the films are much clearer than the picture one sees with the naked eye through the microscope alone. An ordinary camera and a low-powered micro-

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scope will take wonderfully well-defined pictures.

It has been found that some of the most minute organisms dart about with amazing swiftness and actually move faster relatively than a horse in running. To film this rapid locomotion the ordinary movie camera which takes but sixteen pictures to the second is much too slow. Special cameras must be used for such photography, and the apparatus be driven electrically. With the use of the ultra microscope films have been made of microbes so minute that two million of them might be placed in a square measuring only one twenty-fifth of an inch. The pictures of these minute objects which no ordinary microscope could detect are, of course, prodigiously magnified when thrown upon the screen and their habits may be studied in detail.

Much that is new has been discovered from detailed moving pictures of the human eye taken both in sickness and health. These studies are made on plates since the celluloid films have a microscopic grain which might cloud the more delicate details. It has been discovered in this way that the eye is much

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more sensitive than has been generally supposed, and again that it never comes quite to rest, but is always in motion. By looking into the eye when illuminated with powerful rays of light the oculist can make a diagnosis which would be impossible under ordinary observation.

A complete surgical operation is often filmed and the work of a great surgeon thus shown to the surgeons or to classes of students in many colleges. A remarkable case which has its lesson for thousands of physicians and surgeons may thus be displayed in medical colleges and classrooms all over the world.

The moving pictures of a surgical operation are usually close-ups and the field includes only the part being operated upon and the hands of the surgeon. The exact position of the hands and the knife in making an incision, for instance, are thus shown in detail. The light is so controlled that no shadows are cast which would veil any detail. The interior may thus be shown of a comparatively deep cavity. Such films are made by specialists and are screened only with the special permission of the surgeon who reserves his right to recall

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such a film at will. A photograph record of the comments of the surgeon is sometimes reproduced at the same time.

A remarkable film has been prepared recently of an operation performed with the aid of a local anesthetic in which the patient's face is shown throughout. The film was made with two cameras operated simultaneously and the face has been introduced in the lower, right-hand corner of the film. While an actual incision is being made in the patient's abdomen he is seen to smile and talk with perfect unconcern. The operation takes some eighteen minutes beginning with the administration of the anesthetic and, after reproducing every detail, ends with the dressing and bandaging of the wounds. One of the great advantages of the movie operation is that any part of the film may be slowed up and studied in detail or repeated as often as is required, which would of course be inconceivable in an actual operation.

A physician in lecturing before a class on epileptic fits or St. Vitus dance often has great difficulty in arranging an actual demonstration. The plan has been tried of bringing a number of patients liable to such seizures from some hospital and seating them before the class dur-

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ing the lecture. At least one patient may usually be depended upon to have a fit in the prescribed time and the lecturer could thus illustrate his remarks. The moving-picture camera simplifies the work of the lecturer. Films have been prepared of patients throughout an entire seizure from beginning to end, and the "fit film" is afterwards used for lecture purposes. The colored motion pictures also prove of great value in reproducing the appearance of a patient by showing his death-like pallor or the flushed appearance of the face. These surgical films in some cases run to 2000 feet and require half an hour or more to be run off.

The progress of a disease from the first infection through all its stages can be shown on a single film. Important work has been done with the aid of motion pictures in the study of tropical diseases. A monkey has been infected, for instance, with the germs of the sleeping sickness, and the effects of various remedies realistically shown in thousands of pictures.

The motion-picture camera promises to work a revolution in teaching efficiency in the workshop. In every group of workers there is usually some one who performs his work more

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quickly and efficiently than the others. It is often impossible to detect the secret of his success no matter how closely he may be watched. The camera is a very close observer and a close-up showing his every motion is certain to reveal the secret of his success. The picture is made against a white wall ruled with heavy black lines while a clock face indicating the fraction of a second is placed beside him. A careful study of such a film shows where a movement is saved at one point or a particular attitude is best for certain work. The clock meanwhile makes it possible to time every movement. Once the secret has been detected it is a simple matter to instruct other workmen.

Such films have proved very useful again in showing the best position for placing the tools before a workman or the parts which he must pick up in assembling a machine. In the course of a day's work a man may be obliged to pick up hundreds of screws or bolts, and take up and lay down his tools scores of times. A continuous film is made recording every movement, and this is run over and over again and every detail examined until the best position is found for every tool and part. The trouble and expense of preparing the film is amply re-

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paid if a few seconds can be saved in the course of an hour's work. The saving is nothing in the case of a single workman, but when this economy is multiplied by several thousand and repeated every hour in the day the increased efficiency may mean a saving of thousands of dollars. The new application of motion pictures which is known as "Micro Motion Study" is employed with great success in American automobile works.

The national history museums find photography indispensable. The camera is more effective than a gun in securing trophies of any hunt. Large sums of money are expended regularly on photography, and the world is ransacked for material. In preparing the graphic groups of animal life, from insects to elephants, which are so attractive a feature of the modern museums, the naturalist works largely from photographs. If a life group of elephants or lions is to be prepared showing them posed naturally in their native haunts, the movie naturalist journeys to Africa or India to gather material. Dr. Carl E. Ackerly of the American Museum of Natural History, for example, has made three such trips to Central Africa and spent four years in the jungle

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with his camera. These photographs show in detail the natural position of the animals while feeding, running, or fighting. The texture of the skin and the modeling of every part are reproduced. Even the foliage is taken in these groups and backgrounds painted from the photographs to complete the picture. Since a good group of this kind may be worth \$5000 or \$10,000, a naturalist may pay as much as \$1000 for a few good photographs of the animals in their native haunts.

The remarkable groups of birds native to Illinois preserved in the Museum of Chicago, again, would not have been possible without the aid of the camera. In gathering material photographs were taken of the birds in their native haunts, and the naturalists in preparing the groups worked from transparencies prepared from these negatives. Every blade of grass, or twig, or leaf, has been reproduced with absolute fidelity. It would have been impossible for any naturalist by merely trusting his memory to have made so complete a picture. An ingenious use has been made of photography in this collection by placing a drawer of photographs directly beneath the groups, further illustrating the life of the birds.



## SCIENTIFIC RESEARCH

The astronomer is to-day a skilful camera man. Every astronomical observatory of importance has its elaborate photographic equipment. Scarcely a day passes that the sun is not photographed. Most of the comets and asteroids and the fainter satellites are detected by the camera. The human eye may fail to notice their presence, but the sensitive plate records a faint trail of light. A famous instance was the discovery of Halley's comet in 1910, which was first observed on a photograph negative. The astronomers at the Harvard Observatory have recently announced the discovery with the aid of the camera of a new star of the eleventh magnitude in the constellation of Ophiuchus, which moves at the rate of only ten seconds of an arc a year. Hundreds of cameras, reinforced by the most powerful telescopes, constantly sweep the heavens, and with their aid the world may enjoy the wonders of astronomy which heretofore could be seen only by a very few.

## CHAPTER XI

### TRAVEL AND ADVENTURE

**T**HERE is perhaps no more fascinating study than the Aurora Borealis, and endless discussion has been carried on as to its cause and effect. A few still photographs have been made of this remarkable phenomenon and many drawings. A Danish professor was the first to realize that if the lights could be caught by a motion-picture camera they might be studied in detail. At the proper season he therefore journeyed to Spitzbergen and later to Greenland, carrying a motion-picture camera. The trip in each case had to be made in the dead of winter and in the face of Arctic storms. The camera man has probably never worked in colder weather or in a more exposed position. The films which faithfully reproduced the brilliant play of colors proved well worth the effort.

The camera men in the astronomical observatories have, of course, surpassed all other rec-

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ords for long distance work. With the aid of powerful and complicated apparatus they have focussed their cameras on distant planets and taken many amazing photographs. The photographs of the so-called canals on Mars, for instance, are remarkably successful.

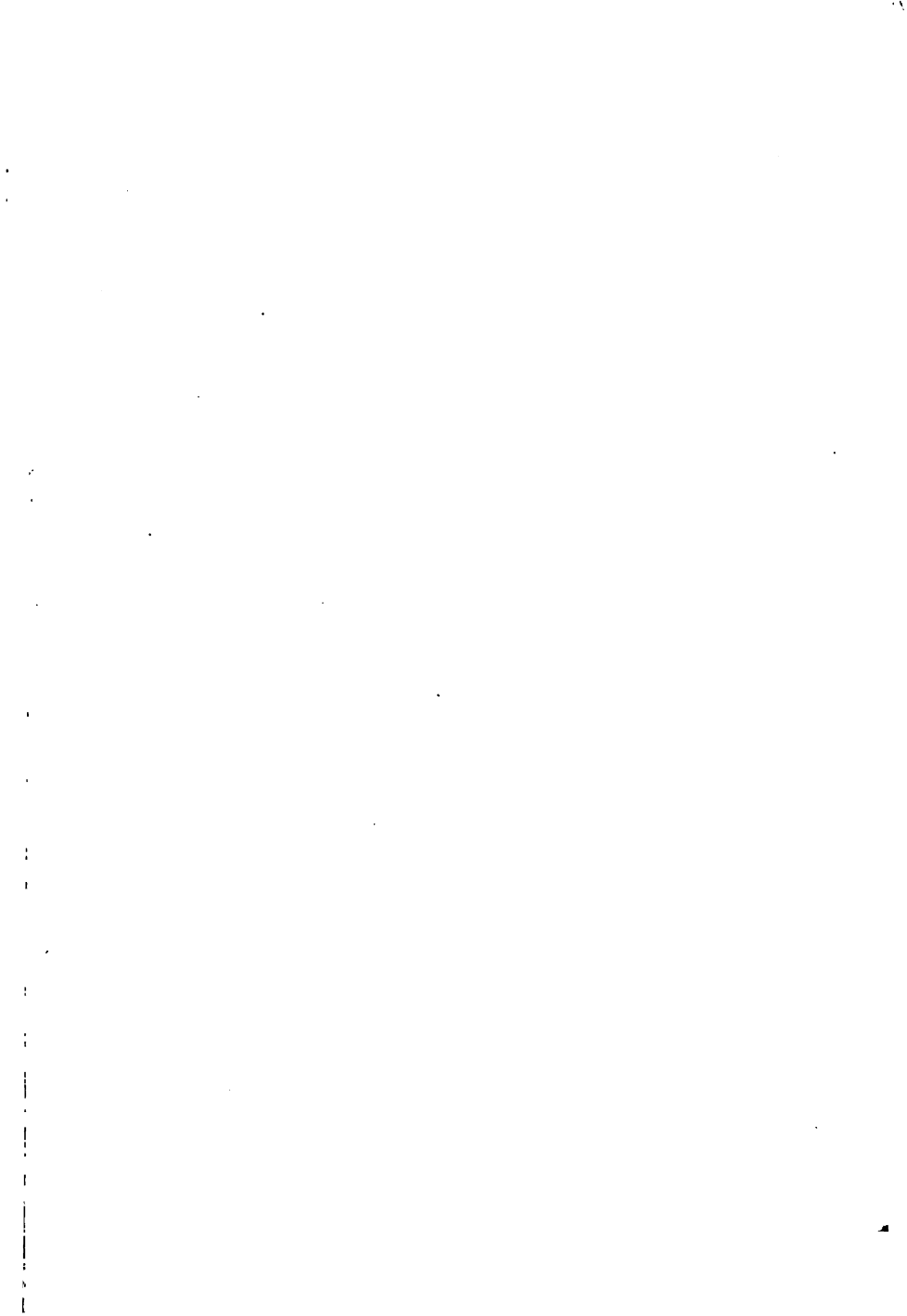
Among these astronomical photographs the most interesting perhaps are those of the solar eclipse. These actually show the flames darting out from the face of the sun. The moon is also followed through its phases by the motion-picture camera. To make such exposures, a photographer must often live for months in remote and inaccessible observatories far from any human habitation. The most powerful telescopes are usually installed on the top of some high mountain, such as Mt. Washington, or in the famous Lick Observatory. To secure pictures during the winter months the camera man, with a few other observers and an ample stock of provisions, will be snowed in for several months without seeing a single face, outside his own little company. The winter's provisions include, of course, a complete developing and printing outfit.

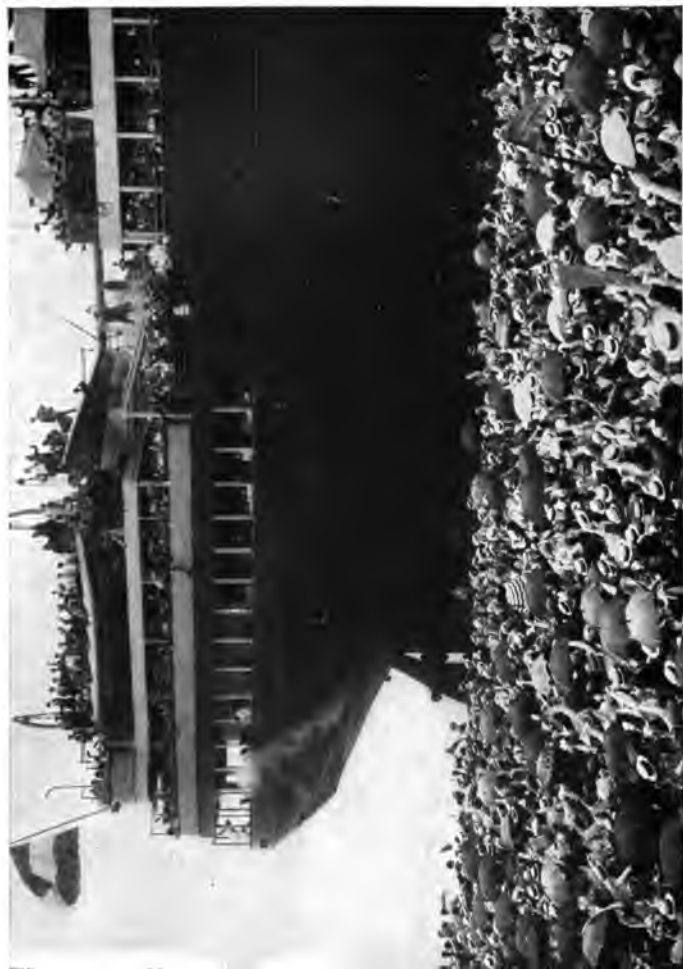
No branch of photography perhaps necessitates so much traveling as educational films.

## THE CAMERA MAN

The camera has become one of the most instructive and certainly the most popular teacher in the world. Its lessons are studied by tens of thousands of pupils in hundreds of classrooms. One of the newest ideas in the schoolroom is to teach geography by means of motion-picture films. The geographies with their tiresome lessons and charts of pink, blue and yellow countries are replaced by fascinating movies in which the most distant parts of the world unfold before the eye.

Suppose the lesson in geography for the day has to do with the source and growth of some great river. The camera man journeys to its headwaters and shows the insignificant spring, the overflow of some lake, or the melting of the glacier from which it starts. Farther down stream the tributaries are pictured flowing into it and gradually swelling its volume. The falls and rapids, or the curious channels it has cut by constant erosion, and other natural wonders, come in turn. The boats and river traffic of all kinds which it supports are pictured in a few feet of film, with the principal towns and cities along its banks, and finally its harbor and entrance into the sea complete the picture. Months are required in preparing such a film,





The departure of a great Ocean Liner

## TRAVEL AND ADVENTURE

and the camera man has journeyed hundreds of miles by land and water to prepare the lesson.

What pictures again have required more patience or downright courage in the taking than the detailed studies showing life and habits of the honey bee? Although the bee is noted for its industry and ingenuity, patience is not among its virtues. It deeply resents any intrusion into its private affairs. The camera men who have stood by their guns—or rather camera—under fire do not show greater courage perhaps than the photographer who grinds his camera continuously when attacked by bees.

The bees cannot be transferred to the studio and the camera man must work early and late for days at a time in the open in all kinds of weather to catch characteristic studies. He may have to wait for hours with his camera loaded and focussed until they swarm. Every detail of the life of the bee, the building of the combs, the care of their queen, the killing of the drones, and the gradual accumulation of honey has been photographed in many hundreds of feet of film. It is pleasant to know that the camera man was well repaid for his

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work, as his complete film, representing several months of work, sold for \$10,000.

Many thousands of feet of film have been used in studying bird life, often under extraordinary conditions. To secure a "close-up" of a bird's nest hidden away on the face of some tall cliff, for instance, the camera man must often be an experienced mountain climber. Some of the most interesting films have been secured by suspending the photographer by a rope so that he may secure his pictures close to the birds' homes. The photographer has need of both hands for climbing, or to protect himself from the attacks of the birds, and a special moving-picture camera has been designed for such work. A tripod is, of course, out of the question. The camera is hung around the photographer's neck or strapped to his body, and the film is exposed automatically. The crank is turned by a miniature engine operated by compressed air. The camera man touches a button and some six hundred feet of film is run off by the mechanism. It is the familiar principle of you-touch-the-button-we-do-the-rest applied to motion-picture work.

Years may be spent in taking a single film which may not run to more than one thousand



## TRAVEL AND ADVENTURE

feet. An English woman spent two and a half years in making a thousand feet of film illustrating the life of the moorhen, which included the building of the nest, the laying of eggs, and the hatching and rearing of the young. The camera had to be so completely concealed that the birds were unaware of its presence. Months were spent in locating a good subject. Day after day this patient operator stood silently beside the camera waiting for the birds to take the proper pose. The one thousand feet of film sold for \$3,250.

One of the most remarkable "close-ups" ever made was the film showing the habits of the common house fly, which was used in connection with the "Swat the fly" campaign. The camera man obtained pictures in wonderful detail of the flies disseminating disease. So sharply were the pictures focussed that even the footprints of the flies were clearly defined. The layman can scarcely realize the patience required in such work. Let the fly buzz away for an inch from the center of the field and the film would be ruined and the camera man must re-focus his camera, put in a new film, and again wait for the fly to light within the range of his lens.

## THE CAMERA MAN

Another camera man journeyed to the Arctic regions and was frozen in for two years simply to obtain a good film of the life and habits of the polar bear. Throughout two long Arctic winters it was, of course, impossible to make any photographs for lack of light. Even in the short summers of this region there were comparatively few days when the light was really good. The search for photographic material took him far over the ice fields. Hundreds of weary miles were traveled across the ice with the motion-picture camera and supplies carried on dog-sleds. When a favorable subject was found it must be approached with extreme caution. The take during this period amounted to eight thousand feet and of this nineteen hundred feet alone sold for \$10,000.

No class of motion pictures perhaps makes such an appeal to the imagination as the studies of wild animals in their native haunts. There can be no deception about such work. To steal up so close to lions, tigers, and elephants demands dauntless courage on the part of the camera man and great skill and cunning in managing the instrument. The old circus "thriller" in which the trainer entered the lions' cage was a simple performance by com-

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A great cruising steamer in a Norwegian fjord

## TRAVEL AND ADVENTURE

parison. The camera man must resort to the most extraordinary devices and months may pass without securing a single foot of film.

Long and expensive journeys must first be made to India or Africa to secure such film. The wild animals' haunts, of course, lie far off the ordinary lines of travel, and the jungles must be traversed on foot in many weary marches. With the aid of native runners the game must be stalked with the utmost care. Most animals can detect the presence of a man by their sense of smell at considerable distances, so that the pictures must always be taken from the windward side. The whirl of the moving-picture camera, so unusual in the jungle, will frighten the least wary game.

One ingenious camera man deceived the jungle animals by concealing his moving-picture camera in a *papier-mâché* cow of lifelike appearance. The cow was set up on the edge of a large pool where the wild beasts came regularly to drink. The photographer climbed through a side door in the cow, which was then tightly closed. The interior, though cramped, was well lighted and ventilated. The lens of the camera protruded through a small hole in

## THE CAMERA MAN

the cow's side. Many amazing "close-ups" were obtained, and a single section of this film measuring five thousand, five hundred feet in length sold for \$40,000 and was exhibited all over the world.

Another camera man concealed himself from his wild animal subjects by constructing a floating island which appeared to be merely a mass of boughs drifting in the stream. His camera was set up on a stout floating base which took the place of a tripod. On the first trail the game was frightened by the whir of the camera as the film was turned, and ran away. A second camera, an empty one, was then mounted beside the first on the floating base. Whenever the game approached the empty camera was ground continuously. After several days the most nervous of the game came to accept the whirring click of the movie camera as a natural phenomenon and approached it freely without taking any notice of it. When a picture was to be taken the empty camera was silenced and the whir of the loaded camera took its place. It required seven weeks to secure the required film.

Still another wild animal photographer concealed his camera amid the heavy foliage of a

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tree-top overlooking a water hole. A platform was built among the branches, and perched here high above the ground the camera man lived for days at a time. The camera looked directly down upon herds of wild animals who drank and bathed in the pool. The whirr of the camera mechanism would occasionally reach them and the films show their curiosity and alarm at a sound which they naturally had difficulty in identifying. The giraffes in particular, perhaps because they carried their heads nearer the tree-top, were greatly mystified and may be seen in many pictures craning their long necks to catch a glimpse of the intruder.

In one of his exploring expeditions in the far Southwest, Professor F. I. Monsen, F. R. G. S., once chanced upon a remarkable river, or rather the dry bed of a stream, cut deep among rugged and inaccessible mountains. He had been traveling for many days with his cameras and other equipment carried on the back of the hardy little burros, or mountain mules. By following the river bed he could penetrate deep into an unknown region and secure remarkable photographs. The mountains rose sheer on either side so that one

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might be obliged to travel for miles before finding a point where he could climb out.

The native guides at first refused absolutely to venture into this ravine. Although the river bed was perfectly dry, it was the season, they explained, when freshets might start without warning and sweep down these deep channels faster than a horse could run. It might be necessary, they pointed out, to race these torrents for several miles before a footing could be found to climb the sides. The only warning of the approach of the freshets was a peculiar low musical note which could be heard for miles, made by the water rushing over the dry sand.

The Professor was so intent on getting his photographs that he decided to chance the danger. Several expeditions were made in this way without accident, but one day as he stood on a particularly deep gorge, busy with his camera, his guide heard the ominous note of warning. The picture was never taken. The camera party literally ran for their lives down the river bed. Thanks to the alertness of the guide, they had a start on the flood of about eight minutes. The handicap enabled them to reach a break in the bank about a mile





Ball room scene on a great Ocean Liner



Deck sports at sea



## TRAVEL AND ADVENTURE

distant and climb to a point of safety by the time the first onrush of water had almost reached their feet. A few minutes later a raging torrent filled the deep channel.

A movie company of several hundred actors, a camera man, and mechanics will often journey long distances to find just the right background for their pictures. It often happens that a scene will require tropical foliage, and the actors who have perhaps been posing in some studio in New York will be obliged to make the trip to Florida to find an appropriate setting. The scenes which necessitate a trip of a thousand miles and return may be reeled off in a few minutes. In the same way trips are often made far north to find a background of snow and ice. A motion-picture company may have to journey far into Canada to overtake the winter. Camera men have journeyed all the way to Alaska in midwinter to get realistic pictures of dog-sleds, or views of the glaciers.

Some of the most interesting expeditions made for photographic purposes have been sent out under the direction of the American Museum of Natural History. The negatives and films brought back as the results of sev-

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eral years of travel and exploration are among the most valuable possessions of the museum. A wide variety of subjects have been photographed by these scientists. On a recent expedition to Central Africa a representative of the museum attempted to photograph a lion hunt. He secured some amazing pictures, but experienced great difficulty in setting up and focussing his motion-picture camera quickly enough to get the action. It was a rather perilous experiment, since the lion might single him out at any moment for attack.

The camera man was guarded by a number of native hunters armed with spears. At a critical moment the lion sprang directly at the camera, but was brought down only a few feet off by several spear thrusts. The Professor, profiting by the experience, has invented a special motion-picture camera he can adjust in twelve seconds which he intends to use in wild animal photography in future expeditions.

A motion-picture film of any remote or little visited region is likely to have considerable commercial value. In planning an exploring expedition, most travelers nowadays include a moving-picture apparatus in their outfits. A good film of the native life of some distant

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and unfamiliar country, or pictures of its natural wonders, is readily salable. The party under the direction of Captain Fritz Duquesne, for example, which started inland recently from Buenos Aires to visit the rubber-producing regions on the upper Amazon, carried along a motion-picture camera. The movie films often prove a valuable by-product of an expedition.

A new charm has been lent to the moving-picture drama by enacting a famous play or novel in the setting described by the author. An American company was sent to rural England to dramatize "Pickwick Papers" amid the scenes depicted by Dickens. The play becomes wonderfully realistic in this original setting. Mr. Pickwick and Sammy Weller go through their familiar adventures at Bury St. Edmunds, or we see them driving along picturesque English lanes. The famous scene between Mr. Jingle and Sammy Weller was played before the original pump in the courtyard of the Angel Inn. In dramatizing Dante's *Inferno* for the movies an elaborate spectacle was arranged among the Italian hills which Dante described in his poem. Many famous scenes from Homer's "Iliad" were en-

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acted on a rocky bit of Grecian seashore to catch the spirit of the original. In America a dramatization of "Hiawatha" was filmed in the setting which Longfellow has described. An elaborate film of "Hamlet" has been made in part on the ramparts of Elsinor Castle in Denmark.

## CHAPTER XII

### THE FIRST CAMERA MAN

**T**O produce pictures by some agency other than the human hand has been the dream of scientists and romancers for ages. The appearance of the modern photograph, like the flying machine, had been foretold with amazing accuracy. The Chinese discussed magical methods for reproducing pictures thousands of years ago. A famous French writer, Fénelon, in a romance published in 1690 describes how portraits and landscapes would some day be reproduced on the surface of basins of silver. Nothing was known at that time of the chemical qualities of silver, which later made the photograph possible, so that Fénelon's prophecy must be considered simply as an amazingly lucky guess. Another writer, Tiphargue, in a novel written in 1760 tells of a magic cloth which on being deposited in a dark place retained a beautiful image, which is doubtless the first mention of the photographic dark room.

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Something was known of optics and lenses, which is so essential a part of photography, even in remote antiquity. A lens, now preserved in the British Museum, was found in the ancient city of Nineveh. The Emperor Nero had some form of reading glass. The first photographs were made through lenses borrowed from telescopes. It is thought that the mysterious alchemists of the Middle Ages chanced upon the chemical reactions which have since made photography possible. In their search for a method of transmitting silver into gold they unconsciously laid the foundation of modern chemistry. They were not interested in any change in silver, however, which did not look like gold, and so probably missed this really golden opportunity.

As early as 1556 it was observed by Fabricus that certain silver ores turned brown on exposure to the light. Here was the great discovery, blindly chanced upon, which was later to make photography possible. It was thought, however, that the change of color was caused by heat. There was no thought of putting the discovery to any practical purpose and it was not until 1727 that any use was made of it, when writing was first copied in



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this way. By the year 1777 there were several chemists at work on the effects of light upon chemicals.

Photography has been a growth of very slow evolution. The modern camera was anticipated by the so-called camera obscura. By placing a lens at the center of a conical roof and reflecting the image with the aid of slanting mirrors an object—usually a stretch of landscape—could be clearly pictured. The camera obscura was merely a toy, however, but it had been perfected and men had become expert in constructing and adjusting lenses. The opening of the nineteenth century found the science of chemistry and optics ready for the great discovery.

Despite the common opinion, Daguerre was not the father of photography. Like Robert Fulton, he utilized an earlier discovery and developed and placed it upon a commercial basis. The first man to make a permanent photograph was Joseph Nicéphore Niépce, a French chemist born in 1765. A statue has been raised at Chalons, France, to Niépce's memory, but his name has not been given to any photographic process, and despite his wonderful contribution to science and art he is little known. His first

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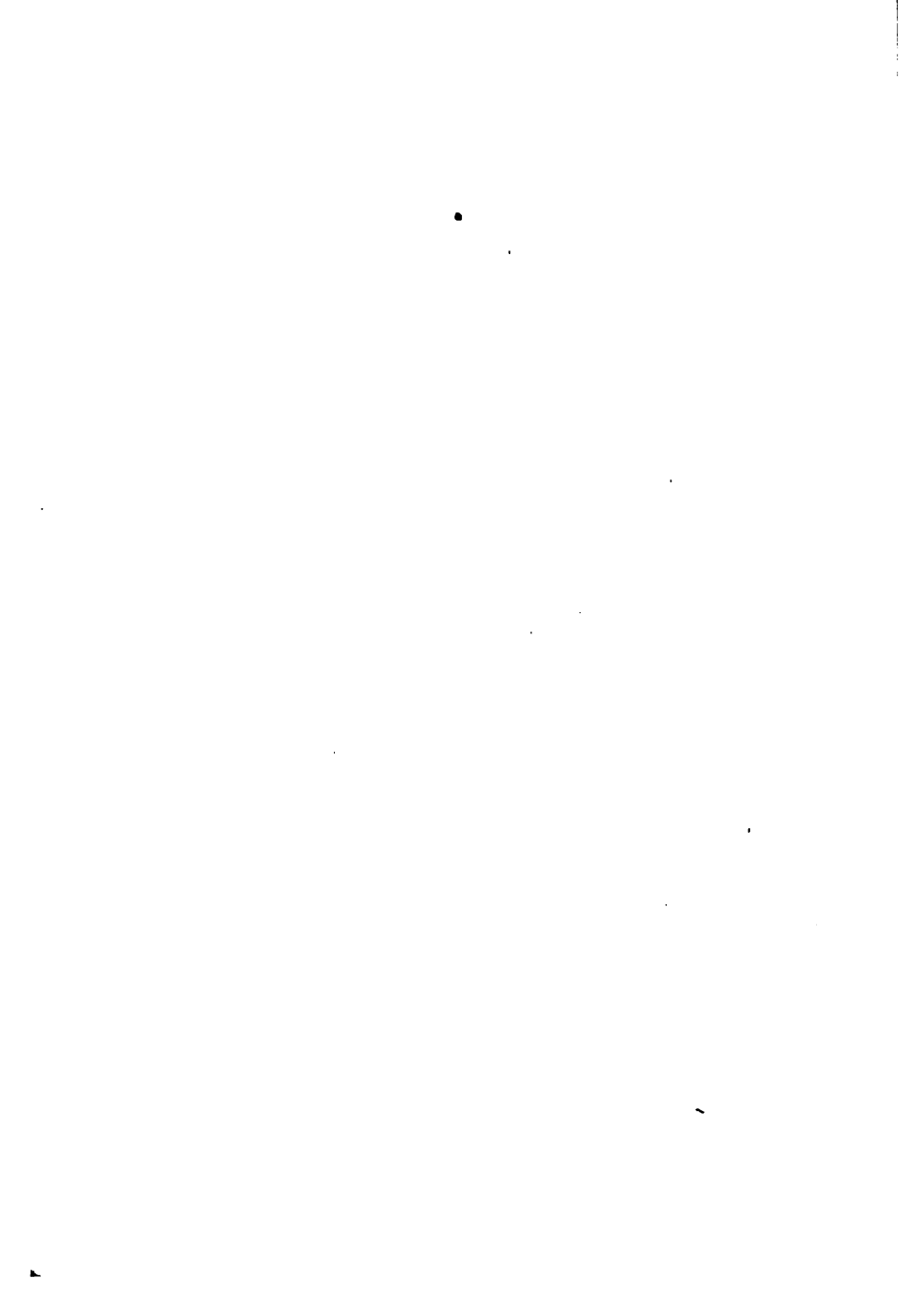
camera was fashioned from a cigar-box. His lens was borrowed from a microscope. The first picture, which was a very crude affair, was made in 1824, following a lifetime of study and research.

Niépce spent many years in England, where he received much encouragement. On his return to France he went into partnership with Louis Jacques Mandé Daguerre, and it was to him that he bequeathed his secret. Daguerre was not a chemist like Niépce, nor had he had the benefit of a scientific education. He had been a scene painter and a showman. For years he had prepared and exhibited panoramas. To the new enterprise he brought abundant enthusiasm and energy, and a practical business sense. It is pleasant to know that he has been one of the few inventors to enjoy the reward of his labors, for he lived to win world-wide fame and considerable wealth.

From the first, Daguerre had perfect confidence in the new science and, despite many disappointments, he never faltered in his work. It is said that he literally lived in his laboratory where he spent nine tenths of his time. Madame Daguerre finally decided that her husband had gone insane over picture-making



An actual moonlight picture of the Hudson River  
(Exposure 35 minutes)



## THE FIRST CAMERA MAN

and several scientists were consulted to decide the question. They visited his laboratory and after examining his experiments finally decided that his search was not "absolutely impossible." Daguerre returned to his work.

One of the most important discoveries in the history of photography was chanced upon by the merest accident. In the very early days of his art Daguerre found it necessary to make exposures of from five to seven hours. One day he had set up his camera and commenced one of these interminable exposures when he chanced to be called away. The plate which had been exposed for only a few minutes was worthless, as he supposed, and he stowed it away in a dark closet intending later to clean the glass for future use. The following day he was astounded on picking up the glass to find it "developed." The picture had appeared miraculously over night.

There could be but one conclusion. The closet contained several chemicals in open jars and bottles and Daguerre realized that the action of one or more of these chemicals had worked while he slept. He had not the least idea what the chemical was, however, so he began at once by a patient system of elimina-

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tion to discover what the wonderful new force might be. He exposed a series of plates for a few minutes, and set them away in a dark closet with one chemical after another. It proved to be slow, disappointing work, but he found at last that the "developing" was done by mercury. A plate which had been exposed for only a few minutes was placed over a dish of mercury which was then slowly heated and the picture grew before his eyes.

It was not until five years after the death of Niépce that Daguerre announced his new discovery, which made it possible, in his own words, for "objects to draw their own pictures." Paris was at first incredulous.

The scientific world soon flocked to Daguerre's laboratory, however, and was convinced. The French Government granted him a pension of six thousand francs. The first pictures were very crude, but they were gradually improved. Daguerre manufactured and sold the apparatus for making the new pictures and the fame of the daguerreotype, as it came to be called, spread all over the world. The early daguerreotypes had a peculiar beauty of their own and even with the marvelous ad-

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vance of the art are still extremely creditable pictures.

Picture making is now so simple a matter that we can scarcely realize the patience and labor required by the early camera men. For a long time no plan could be discovered to keep the developed pictures from fading when exposed to the light. It was hoped at first that a very thorough washing might make the image permanent, and the plates were cleansed for hours in running water but, of course, without result. Another futile plan, which aroused high hopes for a time, was to varnish the plates, but the pictures nevertheless soon faded away. The first fixing-bath consisted of common salt which was none too effective, but the discovery marked a wonderful advance. The first daguerreotypes, by the way, were so sensitive that the slightest touch of the finger would destroy them.

The first photographs were pictures of Paris buildings and street scenes. The tedious exposure at first made portrait work impossible. As early as 1839 an attempt was made in America to photograph the human face. It was necessary to cover the face with white

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chalk and the exposure was made in the brightest possible sunlight. For many years one who posed for the camera was said very truthfully to have had a "sitting." A very long exposure was required under the most favorable conditions. The sitter's head was firmly braced to relieve the strain. The support which gave the subject a hopelessly rigid, ramrod appearance has only recently been abandoned in some studios.

Daguerreotypes were made on polished steel or silver plates. It was found that the silver could be made so sensitive to the light that it could be darkened even by momentary exposure. Several Americans and Englishmen now commenced investigations on their own account, and progress was rapid. Pictures were soon taken on paper which was made transparent by oil or wax. These were first called "negatives" by Sir John Herschel in 1841, and the print was called a "positive." It was possible to print from the negative and get any number of prints with a single exposure, which marked a great advance.

The first instantaneous snap-shot was made as early as 1857. There were no shutters at that time, but the picture was taken by the



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flash of a battery of Leyden jars. The exposure must therefore have been very fast. The first sensitized paper was used by an Englishman named Talbot. As early as 1777 it had been discovered that a red light produced no effect on silver chloride. It was not until 1851, however, that a colored light was used for developing. It is probably too late at this day to change the name, but certainly the so-called "dark room" should by rights be called a "red room."

It was considered an ordeal in the early days to pose for a photograph. The strain of keeping absolutely still for several minutes at a time was hard on the nerves and muscles. The heat of the sun in these long exposures often became really painful. To make the sitter more comfortable it was arranged for the light to pass through a tank containing some blue liquid, usually ammonia.

The first landscape ever taken in the United States is believed to have been a view of New York harbor made in 1842. The new art was much more popular even in the early days in America than in England. Despite the difficulty of the ocean voyage in those days, many people journeyed from America to Paris to

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secure apparatus and study the new art under Daguerre.

From the earliest days the American camera man has been noted for his enthusiasm and inventiveness. Perhaps the first of our inventors in the new field was A. Walcott, who designed a camera equipped with concave mirrors in place of lenses. The photographic plate was exposed at the focus of those mirrors. His invention was called a "reflecting camera." Walcott went to London in 1840 to patent his device. The first book ever illustrated with actual photographs was published in Philadelphia in 1844. Although rolled films or "paper negatives," as they were first called, did not come into general use until 1886, they were suggested as early as 1854.

One of the most daring camera men was doubtless the famous photographer Brady, whose pictures have preserved an invaluable history of the Civil War. Brady was obliged to work with the old-time wet plates, which had to be prepared in the dark room shortly before the exposure. He must set up his dark room literally on the battle field, and often under fire. His camera was large, heavy, and unwieldy, and his plates according to all modern stand-

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ards very slow. Despite these handicaps he secured hundreds of amazing "close-ups." His portrait studies of President Lincoln, General Grant, and scores of famous men taken often under great difficulties are beautiful examples of the photographer's art.

The "movies" seem so recent a development of the photographic art that the youngest reader of these pages may almost recall their first appearance. It comes as a surprise to find that a crude form of the motion picture dates back for more than a century. The principle of the movies was understood even before Daguerre announced his first pictures, and our ancestors wearing knee breeches, lace cuffs, and periwigs enjoyed an exhibition of this kind. Early in the last century an ingenious disk machine was invented on which the pictures were illuminated in rapid succession by a narrow beam of light. By revolving the disk one picture would replace another so quickly as to produce the familiar optical illusion of motion. The pictures which were very simple outlines were, of course, drawn by hand.

One may still find in some toy shops examples of the little whirligig known as the "Zoe-trope," which was the first motion-picture ma-

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chine to be placed on the market. It dates from a period previous to 1850. The general principle of the modern motion picture was utilized in this little toy with considerable ingenuity. It consisted merely of a hollow pasteboard cylinder which could be spun rapidly by a turn of the hand on an upright spindle.

A series of narrow vertical slits were cut at regular intervals about the top. The pictures, which were merely outline drawings showing a simple object in ten or twelve successive positions, revolved rapidly on the inside of the cylinder so that they could be seen through the narrow openings. As the cylinder spun around the narrow windows exposed and cut off the picture much as the modern motion-picture machine acts on a film, and the silhouette or the cardboard seemed to run, jump, or dance.

The first movies to be made with the aid of the camera were the work of Edward Muybridge. It was not until 1870 that dry plates were made sensitive enough to take snap-shots faster than one-twentieth of a second, but from this discovery the modern motion picture may be said to date. There were no cameras at that time adapted for taking pictures in rapid succession, and Muybridge overcame this



The happy groups on the sunny decks



A three-legged race on a cruising steamer



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difficulty by using a separate camera for each exposure. A battery of twenty-four cameras were used for the experiment, which was carried on in California. The twenty-four cameras were set up at equal distances and the shutters of the lenses were arranged so that they would be released automatically by the object passing before the camera.

The series of twenty-four pictures were taken of a running horse. A string from the shutter of each lens was stretched across the track so that the horse would break the strings as it passed before the cameras, thus making the exposures. The pictures were taken against a white fence that the horse might be thrown in sharp silhouette, for detailed pictures were impossible. The negatives were made successfully, and were then thrown upon a screen by using a modified form of the zoetrope. The motion of the horse's legs was shown clearly, but the horse refused to move forward and only jumped up and down at the center of the screen. This curious effect was the result of taking the pictures from different view-points and not from a single camera. In up-to-date movies this effect is often produced by photographing a running horse from an au-

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tomobile which keeps constantly abreast of him. The first motion pictures attracted an immense amount of attention, but they had no commercial value. To produce a series of pictures such as may be taken to-day on a film one thousand feet long would require a row of sixteen thousand cameras.

In the days before the invention of celluloid films many ingenious attempts were made to utilize dry plates for moving-picture photography. A series of one hundred and sixty pictures was arranged, for instance, on a single plate, and a projecting machine was devised which moved the plate up and down and shifted it from one row to the next automatically. The mechanism was very complicated, and continuous pictures of any length were of course out of the question. Some very interesting experiments were made in motion-picture work by Thomas Edison before the discovery of the celluloid film. The appearance of the celluloid film solved all the difficulties, and shortly afterward the "kinetoscope" was first exhibited at the Chicago World's Fair in 1893.

While we are still busied with experiments to catch the colors of nature in our cameras, it is interesting to find how old the search has



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been. More than a century ago, in 1810, a Dr. Seebech passed a beam of white light through a prism and obtained the varied colors of the spectrum. After that was allowed to rest upon a sensitive surface prepared with chloride of mercury, it was believed that traces of the color remained. And again in 1837 Sir John Herschel noticed that the colored lights affected sensitized surfaces. Further experiments were carried on in 1840. The date of the successful discovery of the colored photograph still remains to be written.

## CHAPTER XIII

### THE FUTURE

**I**N a few years the transmission of photographs by wireless electricity, even across the Atlantic Ocean, will probably be a commonplace. An actual photograph taken in London or Paris of some important news event will be transmitted by this unseen force and appear in the newspapers in America within a few hours. We will have a wireless telegraph picture service, just as to-day the cable service knits the entire world so closely together. In other words, the camera man will in effect enable us to see across the Atlantic, or to the furthestmost corners of the world.

The wireless transmission of photographs is to-day in its experimental form, but its success is so astounding that we may foretell its future. Photographs have been sent by wireless telegraph for a distance of four hundred miles, and have been reproduced so clearly that they

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might be used for newspaper illustration. In these tests a short cable was utilized, but for the greater part of the distance the transmission was accomplished without wires. There are to-day several systems of transmission which work well enough for conducting laboratory experiments. The apparatus used is neither very complicated nor very expensive. In these laboratory tests a photograph was transmitted in about ten minutes.

The system of transmission devised by Mr. Hans Knudsen, which is one of the simplest, will serve as an illustration. He first takes a photograph on a plate covered with gelatin three or four times thicker than is commonly used. After developing, and before the plate is dry, it is sprinkled with fine iron dust. The transparent parts dry much more quickly than the shaded or darker parts, and the iron dust sticks closer to the darker than to the lighter portions. In this way a picture partially composed of iron dust is prepared.

A fine steel point attached to a delicate spring is then automatically passed over the plate in fine parallel lines. Now as the needle passes over the plate and scrapes across the iron filing it is set in vibration, and this move-

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ment breaks the battery circuit of a spark coil. This in turn sets up sparking in the spark-gap of the wireless apparatus. As the mechanism is perfected the messages may be transmitted over greater distances. At the other end of the circuit a similar spring and needle moves along parallel lines over a plate that has been smoked on one side.

The needle is operated by a small electric magnet in circuit with a battery and a sensitive coherer. As the wireless waves are received and the circuit is made and broken, the needle vibrates on the smoked glass in unison with the needle at the other end of the original plate. The scratched plate is printed like an ordinary photographic negative. The wireless camera man will soon be expected to add an expert knowledge of electricity to his many accomplishments.

With the wireless photograph already an accomplished fact, the hope that we may some day see directly by wire seems nearer than ever to realization. For years experiments have been carried on both in America and Europe with this fascinating problem. Several mechanisms have been devised and enthusiastic inventors believe themselves on the threshold

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of a great discovery. The apparatus has even been exhibited at several recent electrical expositions. Somewhere in the science of photography doubtless lies the latest material which will some day make this possible. It is planned to combine some such device with the telephone, so that one may see the person to whom one is speaking. The transmission of a photograph over thousands of miles of space without the use of wires seems no more difficult. Within a few years we may even *see* by wireless electricity.

A curious contrast will be found between the early work of the moving-picture camera in the United States and in Europe. The first motion pictures abroad were exhibited in the laboratories connected with the universities, while some of the greatest actors in Europe were among the first to be filmed. The development of the moving picture has been from the top downward. In America the situation was reversed. The early motion-picture dramas as a rule made a popular appeal, and it has only been recently that the best talent in play writing and in acting has been engaged in the work. The first European pictures were given technical scientific names. In the

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United States they soon became known as "the movies" and the name persists.

The future development of motion-picture dramas would seem to be along educational lines. Now that artistic perfection is being rapidly approached and dare-devil acts and thrills are being exhausted, it is expected that the energies of the producers will be directed toward better motion-picture play writing and acting. The first municipal motion-picture theater has already appeared in Burchard, Nebraska, which is very significant.

Several experiments have already been made to combine the phonograph with the motion picture, but with indifferent success. In the immediate future we will, at the same time, enjoy the lifelike reproduction both of the voices and the acting of the greatest artists. In place of the silent drama we will have an entire opera or the spoken drama realistically presented. Several scientists have announced an entirely new system of sound reproduction by which the voice is photographed together with the picture. The trend of development is unmistakably toward better pictures.

It is generally conceded among the motion-picture experts that the films have in some re-

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spects reached their ultimate development. It seems impossible that the pictures could be more clearly defined or the art of reproduction to-day be greatly improved upon. In the matter of staging these dramas the limit, if not actually realized, seems to be in sight. We already have the "million dollar movie." One of the leading producers believes that if a picture could be devised which would cost five million dollars, the public would lend its support by paying two dollars a seat to enjoy it. The wildest dreams of the moving-picture man have not as yet conceived how such a sum could be advantageously expended.

Since the earliest days of the art it has been the dream of the photographer to produce colored pictures. It will be along these lines, perhaps, that the most striking progress will be seen in the future. Fortunes have been spent in experimenting with so-called color photography. The results in some cases have been extremely interesting, many of the color processes have produced beautiful pictures, but the actual colored photograph still eludes the scientist.

Fascinating pictures have been obtained by the three color process, but it is impossible to

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foretell if the solution of the problem lies along this line. Briefly, this process consists in making three negatives of a subject, exposing them behind filters or screens of red, green, or blue or violet respectively. It is possible so to develop these plates and superimpose them one above another that a transparency will be formed reproducing many of the colors of nature with wonderful realism. There are many ingenious ways of applying this principle, but such pictures require considerable skill and are expensive.

There are several methods by which colored prints may be obtained, but at present the results are not likely to be satisfactory. In one of these the gelatine coating of three plates is transferred to the same sheet of gelatinized paper. To obtain good results considerable skill and patience is required, and although very sharp and beautifully colored transparencies are possible the prints are likely to be garish, if not wholly unsatisfactory. The percentage of successful prints under the most favorable conditions is small. The dream of the camera man is to reproduce the colors of nature as readily as we touch a button or press a bulb, and the marvelous achievements in al-



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most every other line of photography make us confident that in a few years this hope will be realized.

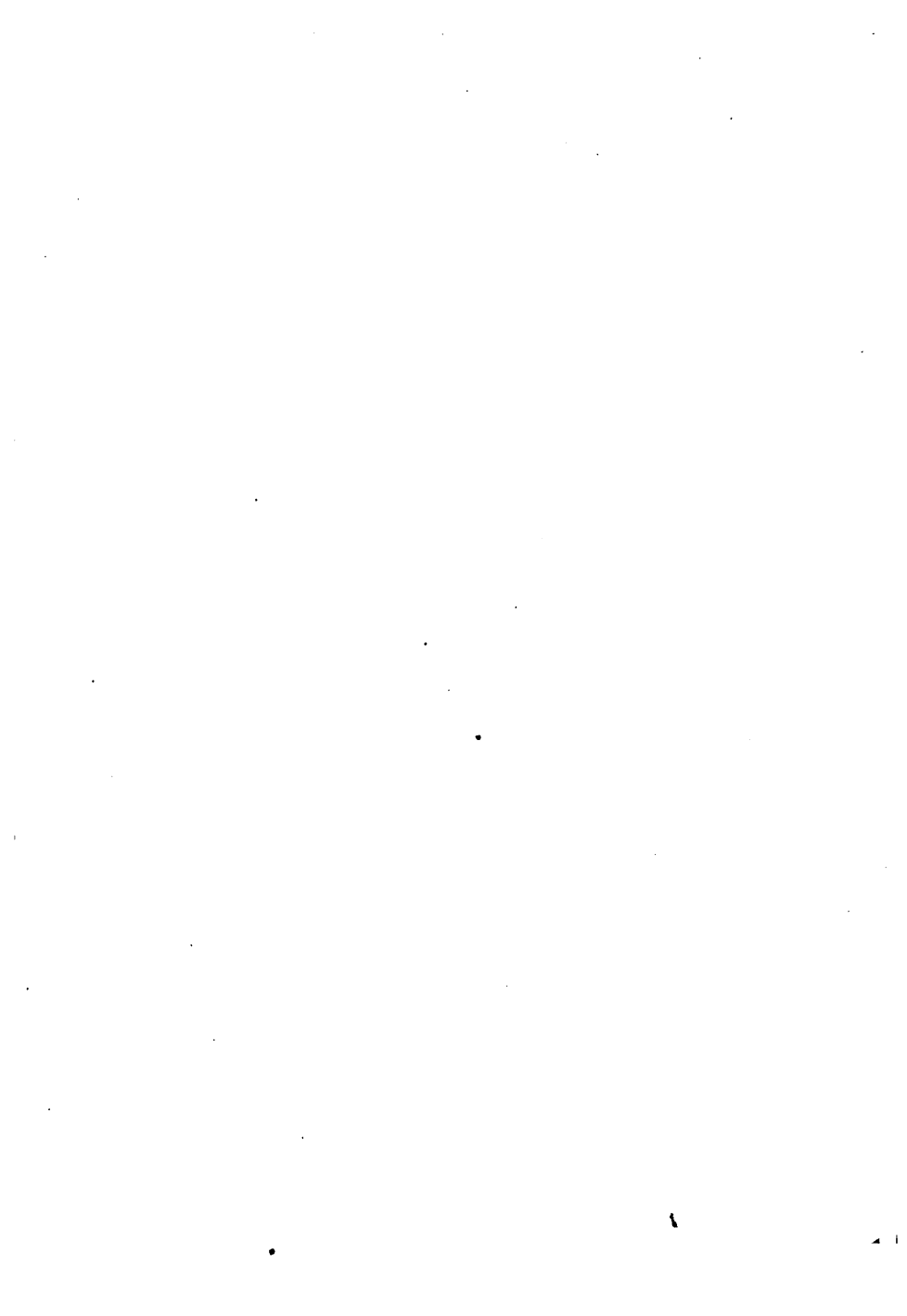
The motion-news picture is only a little more than five years old. In no other branch of photography probably has the development been so rapid. The camera man shows such amazing ingenuity and energy in reproducing news events on the screen that little room seems to be left for improvement. Nevertheless he finds time in his busy life to plan other conquests. The news movie is here to stay. Doubtless in the near future the so-called "animated weeklies" will be daily services. An experiment has already been made along these lines, but the time, it was found, was not yet ripe. The actual motion picture of a news event, it has been pointed out, even to-day can be issued almost as quickly as the news of the event is written and printed in the newspapers. A scene may be photographed, filmed, and thrown upon the screen in less than ninety minutes.

Within a few years, at most, the time for reproducing pictures will be greatly reduced. It is not too much to hope that the work will be so simplified that the entire operation will be

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the work of a few minutes. The movable dark room may be utilized for motion-picture work, so that a film may be finished while the dark room is speeding a mile a minute to the exhibition places. So high an authority on motion-picture work as Mr. Pell Mitchell prophesies that the movie theaters will rival the extra editions of the newspapers in supplying us with the latest news, and with the advantage in favor of the movies that we will see the actual event reenacted before our eyes. The evening audiences at the movie theater will see motion pictures of the events of the day; a fire, a parade, an accident, the visit of prominent people which has occurred a few hours before in their own city, as well as within a range of several hundred miles.

The camera man will no doubt receive much greater government recognition in future in many countries. His skill is utilized to-day in many departments of our Government, notably those of War, Navy, Agriculture, and the Interior, but his work will be greatly extended in the future. In Italy the Minister of Marine has already established a special department of photography and cinematography at Rome. The French Government has set aside a large





(c) Brown & Dawson

A real estate enterprise pictured by an aero camera man

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tract of land for experimental work and pays annually a considerable sum to encourage scientific research. The German, Swiss, and Russian governments contribute regularly to the support of photographic laboratories.

In the future, it seems assured, many national photographic laboratories will be established. There is already a movement on foot to equip an elaborate moving-picture studio and laboratory in connection with the great laboratory at Charlottenburg in Germany. A similar plant may some day be established in connection with our own Smithsonian Institution at Washington. The most skilful camera men in many lines of activity will some day be engaged by the Government for scientific work, just as to-day it employs experts in finance, agriculture, or in the building of ships.

Within the memory of us all, motion pictures have spread over the world, proving a dangerous rival of the regular theater. It has already been suggested in France that the Government establish a national moving-picture studio and engage the greatest artists to prepare films of the highest possible artistic merit, just as it has subsidized the French Theater and Opera. Marvelous as has been its devel-

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opment, the motion picture is to-day in its infancy. In a few years our best work will probably appear crude and limited. In times to come great national moving-picture films may preserve the highest expression of dramatic art.

In a little more than a decade the ordinary hand camera has been completely transformed. Most amateurs will recall the bulky, awkward, boxlike affairs which were then available. The up-to-date folding camera makes a great advance in convenience and general efficiency. Twenty years ago the hand camera was somewhat of a curiosity, and the amateur must set up an unwieldy box upon his tripod to take the simplest subject. As the lenses have cut the image more sharply, cameras have been gradually reduced in size, since a small negative, if sufficiently sharp, can readily be enlarged and the amateur is relieved of carrying much unnecessary baggage.

At the present rate of progress the next few years will doubtless witness great improvements in camera building. The tendency seems to be in the direction of greater simplicity of mechanism. The hand camera may

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be expected to grow gradually smaller and lighter as it becomes easier of adjustment. We already have the pocket camera, an ingenious contrivance capable of taking excellent pictures, which may be carried in one's coat pocket without serious stretching. A vest-pocket—even a change-pocket—camera equally efficient may be looked forward to in the near future. To-day the graflex type is the highest form of hand camera. The pocket camera of the future, some camera men prophesy, will have all the advantages of the graflex with a speed faster than that of the curtain shutter.

Within the past few years we have seen the moving-picture camera reduced in size from an unwieldy laboratory apparatus to a portable outfit which the alert camera man carries about with ease. The movies are still a great luxury for the amateur. It is rather expensive to have one's family portraits filmed, for instance, and the reproduction of a wedding or house party is something of a luxury. The amateur of the future will carry about his motion-picture camera, probably a small pocket affair, and film scenes on his vacation, or the portraits

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of his friends, exactly as to-day he snaps them with his pocket kodak. The projecting machines will be as cheap and common in our homes as is the talking machine to-day.



## SOME PRACTICAL SUGGESTIONS FOR THE AMATEUR

### CHAPTER XIV,

#### THE LENS

**W**ITHIN the past few years scores of ingenious devices for doing away with the drudgery of photography have been placed at the disposal of the amateur. Virtually every difficulty which beset the amateur photographer a decade or two ago has been removed, or at least greatly simplified. Picture taking and finishing has been made almost automatic. However inexperienced the amateur may be, he is reasonably certain to-day of producing a fairly successful picture at the first attempt.

Much depends on the choice of lens. It is more important that you have a good lens than a fine camera box with any number of clever adjustments. In planning your outfit, decide first of all how much money you intend to put

## THE CAMERA MAN

into your lens. A lens may be had at any price from one dollar to a thousand. It depends largely upon the nature of the pictures you intend to make. If your camera is to be your companion on a vacation journey, where you expect to take many snap shots requiring high speed, the lens should be selected accordingly. Should you intend to devote your time mainly to portrait making the problem is entirely different, while for ordinary landscape work still another lens should be selected.

Be sure to keep your lens clean and bright.

The slightest particle of dust will obstruct the light and render the image, and of course the photograph, less clear. The film of dirt or dust which accumulates on the lens may be of microscopic fineness and invisible to the eye. The fact that the lens appears clean at a casual glance, even when held up to the light, does not prove that it is so. A good plan for testing the cleanliness of your lens is to breathe on the glass and watch the film of moisture clear away. If the little cloud of mist does not disappear almost instantly, it is because there are enough particles of dust and dirt to hold the moisture, however clear it may appear.

It is a mistake to clean the lens with any

## THE LENS

piece of cloth which comes to hand. The polished face is extremely sensitive and a harsh piece of cloth or a dirty one, may make microscopic scratches. If this abuse is continued the damage will in time become noticeable to the eye. Never touch the lenses in cleaning them except with a fine camel's hair brush or very soft old cloth which will not leave any lint on the glass. The cleaning may be done without removing the lenses from their tube. The best plan is to clean the outer lenses with a piece of soft old cloth dipped in alcohol. Do not use pure alcohol, since it dries too quickly, but dilute it to half strength with water. The glass should not be bathed in alcohol but merely wiped with a moistened cloth. Under ordinary conditions the lens does not need washing oftener than once a month.

The beginner, and indeed the average amateur photographer, will do well to bear in mind that he cannot be too painstaking in focussing his picture. One may have a beautiful camera and an expensive lens, and a careless habit of focussing will go far to ruin all. A careful camera man with a cheap outfit may obtain amazing results merely through attention to this detail. It is obvious that the image on the

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ground glass should be absolutely sharp, but it is often the obvious thing we neglect. The tendency is to move the ground glass, or the lens, too fast. The screw should be turned very slowly, or you will go too far. The difference between a microscopic sharpness of the image on your ground glass and a blur may depend on a very slight touch of the screw.

A common mistake among amateurs is to focus too far back. Study your picture carefully before you put your head beneath your focussing cloth, or glance through the finder, as the case may be. Many amateurs sacrifice their foreground in order to gain sharpness in the distance. A turn of the focussing screw often determines the whole effect of the picture. A careless or inexperienced amateur may take a picture from exactly the same view point as an artist and yet the effect will be greatly changed by the trick of focussing. Before taking your picture, decide what will be its main features and focus to best bring them out and subordinate the unessential details.

It is a mistake to stop down your lens too far. There is of course a temptation to secure sharpness of focus by the simple method of using a very small stop. A medium sized stop



Sea tales



## THE LENS

is best, as a rule. It is a familiar rule that the larger the stop in your lens, the more detail you will secure in your shadows. What many amateurs overlook is that this latitude in the use of stops and the focussing screw are really great opportunities, when properly understood, in producing artistic results.

In using a hand camera with a scale for focussing, be sure that the gage is absolutely true. Do not take the manufacturer's word for it. In the cheap cameras, especially, the scales may be incorrect. Set up some object at each distance and make absolutely certain that the point indicated on the scale means the sharpest possible focus. A small magnifying glass may be held before the ground glass, if there be any doubt about the question.

The word "focus," by the way, had originally a very different meaning. It is the Latin word for an altar on which the sacred fire burned, or on which offerings were placed and burned. Literally the *focus* of a lens is its burning point, or the point where it converges the rays of the sun and would set fire, say, to a piece of paper. Lenses have so many different forms to-day that this rule does not always hold good.

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In recent years the problem of the exposure has been greatly simplified for the amateur. The beginner who lacks confidence in judging the exposure can readily obtain from the dealers a variety of scale cards which will reduce the question as far as possible to definite figures. Then again plate-making has so advanced that a much wider latitude is allowed to the amateur to-day than in the past. There is virtually no such thing as an absolute exposure. An excellent negative may be made with any one of several exposures of the same subject. A little experience in developing will enable one to correct even a considerable mistake in judging the exposure.

It is commonly said that the latitude in exposing is two. In other words if the proper exposure under given conditions was one second, there is so much latitude allowed that an exposure of two seconds would not endanger the picture. The plate which had been given the proper exposure would not require any special nursing in developing. The beginner who wishes to test his lens thoroughly and acquire experience will do well to make three exposures of the same subject with a wide-open lens. If the subject lies in bright sunlight try



## THE LENS

an exposure of one hundredth, one fiftieth, and one twenty-fifth of a second. If your camera is a simple one and the lens has but one speed, make the three exposures with three different stops or openings. Develop the three plates in the same strength of developer and notice how quickly the image appears and strengthens. By the time the plates have been fixed you will have some valuable evidence to help you in judging future exposures.

The strength of daylight is likely to be very tricky. There can be no absolute rule for exposure. It is not the same at any two hours of the day, and it varies from month to month throughout the year. In mid-winter the light at noon has scarcely half the power it has in the summer months. The light at sunset, again, is only from one fifth to one tenth as strong as at noon, and the exposure should vary accordingly. A convenient rule to remember is that on cloudy or overcast days, when the sun does not cast a shadow, the exposure should be about four times as long as though the sun were shining brightly.

On slightly hazy days the exposure should be double that required for direct sunlight. In photographing dense foliage double the ex-

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posure. In taking a picture at the seashore in the glare of direct sunlight, or a snow scene, remember that the exposure should be from one-half to one-quarter that required in ordinary bright sunlight. A familiar rule in photography is to judge your exposure to obtain all possible detail in the shadows and to let the high lights take care of themselves. To sum up, the exposure is affected by the season of the year, the time of the day, and the general light conditions.

Indoor photography presents entirely new problems. The power of the light is greatly reduced by absorption while the reflection of colored walls, draperies, and carpets must all be calculated in judging the exposure. A sunny room with large windows and white walls will give one the effect of being even lighter than out of doors, but the exposure, one will find, should be two or three times as long. In a room with red wallpaper, or one which contains red or near-red carpets or furniture, the problem is still different and the exposure must be considerably lengthened. Allowance must be made, as in out-door photography, for the season of the year and the time of the day. It will be well to remember in all in-door work

## THE LENS

that it is better to have too long than too short an exposure. The amateur may profit by keeping a record of all the exposures and consult them in making pictures in the future.

There are several simple lens' tests which every amateur will do well to try on any new camera. Learn to know your lens intimately. First of all make sure of its speed at full aperture. There is considerable variation in lenses, even the best of them, and it is of the utmost importance that you make sure at the start just what speed you can get out of yours under varying conditions. Open your lens wide and try several exposures at different speeds, both in direct sunlight and in shadow. Although the speed of a lens may be scientifically measured, one gains an intimate knowledge from actual use which no figures can give.

In buying the cheaper grades of cameras, you may chance on a lens which gives you a so-called "flare spot." This is the disk which appears near the center of the plate and corresponds to any bright object such as a gas flame or window. It usually takes the form of an ill-defined fog patch. It may not appear in many pictures and then may unexpectedly

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ruin one's negative. After you have tested the speed of your lens, take a picture of a bright sky against a dark mass of foliage and develop the negative to considerable density. If your lens has this weakness, the trick will bring it out.

It is essential that the lens be exactly centered. One may chance upon a cheap lens which has been carelessly constructed, or a bad fall may affect a good lens in this way. It is a very simple matter to test it. Focus a light—a candle flame will answer—a little way from the center of the plate and then slowly rotate the lens in its flange. If it be accurately centered the image remains stationary, but if there is any defect, the object will rotate. In buying a lens the dealer will usually allow you ten days' trial, which is of course ample time to become acquainted with it.

There has been of late an interesting revival of the so-called pin-hole lens. Twenty years and more ago the pin-hole picture was comparatively common. Its obvious recommendation was the fact that it cost nothing. A lens might be made by the simple process of sticking a pin through a piece of cardboard. The

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first camera used by the present writer was equipped with a pin-hole lens. An exposure of a minute or more was required with direct sunlight. In a somewhat varied photograph experience no pictures, however, have ever given more pleasure than the first exposures of the pin-hole camera.

The revival of the pin-hole photograph has been due to the fact that these pictures often have a softness of tone which is difficult to obtain with a regular lens. Plates are made much more sensitive to-day so that the exposure with this primitive lens can be considerably reduced. It is a very simple matter to unscrew the ordinary lens and cover the hole with a piece of heavy black paper with a pin hole or a needle hole at the center. The landscapes taken in this way will be found to have a soft Corot effect which is often very charming.

"Pin-hole lenses" have been placed upon the market. A set of these may be bought very cheaply. They are prepared to correspond to the diameters of needles varying in size from one to thirteen. A number one needle, which has a diameter of .053 of an inch, should be placed forty inches from the plate. A number

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thirteen needle, with a diameter of .013 inch, need only be two and one-half inches from the plate. Needles between these extremes will fit an ordinary camera.

## CHAPTER XV.

### THE NEGATIVE

**N**O detail of picture-making has perhaps been so simplified as the development of the negative. A score of labor- and patience-saving devices are now available, which were beyond the dreams of the photographer a decade ago. The chemists have devised new plate emulsions and developers, which give the amateur to-day far more latitude in judging his exposure and in developing his negative than in the past.

It is only a few years since the amateur was obliged to work in a stuffy dark room, and badly stained fingers were a mark of his profession. To-day he is almost independent of the dark room and may escape the drudgery of the work. You may carry your dark room in a satchel and complete the negative in the open air without soiling your hands. If you work with films, the exposed reel may be placed in a winding box and the film wound around an

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axis covered with an apron which protects it from the light. It may be removed and placed in a cup of developer, where the plate negative is developed without being touched by the hands. It is a very simple matter to change the developing solution for a fixing bath, and the negative becomes light proof. It is claimed by some photographers that the negative made in this way is superior to that developed in a tray, since it is so little exposed to the air and runs absolutely no danger of fogging.

There are a number of ingenious developing boxes on the market, both for films and plates. In some of these boxes the roll of films may be placed without the use of a winding box. The film is placed on an angle at one end and the loose end attached to a reel at the other end. The developer is then poured in and the lid, which when closed is light proof, is placed in position. The developing is done by the simple process of turning the crank of the spool. There are similar devices for developing cut films. Plates may also be developed by means of plate tanks. The exposed plates are first taken from the holders and placed in a cage. This must be done in a dark room, although one can get along without the use of a



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ruby light. The cage is lowered into a tank filled with developer, and afterwards fixed and washed without being touched by the hands.

Most dark rooms must be home made. It is all very well, if one can afford it, to select some scientific design and have a room constructed with tanks for running water, electric lamps, and the most approved racks and tables, but the average amateur must make shift with much simpler furniture. It is essential to have good ventilation, cleanliness, and convenience of arrangement. One is likely in closing every crack of light to shut off the air supply as well. While none of the chemicals used in developing and fixing are in the least dangerous, fumes may become unpleasant in a room tightly sealed. The room should be so contrived that currents of air should pass freely through. To keep the atmosphere fresh, never allow chemicals to stand about in open bottles.

Unless one is careful a dark room soon becomes badly stained with chemicals and smells musty. There is no reason why such a room should not be as fresh and pure as a well-kept kitchen. A little care from the first in keeping the room tidy will prevent all this. The trays used for the chemicals should always be

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washed out thoroughly after using. The tables or shelves should be carefully wiped off and the chemicals never allowed to dry on them. If you are so fortunate as to have running water, see that your tanks or sinks are kept clean. Always have a basket or box convenient to the table or shelf where you develop, to catch waste material. An ounce of prevention in the dark room is worth many pounds of cleaning fluids or disinfectants later on.

The simpler the arrangement of your dark room, the better. For ordinary developing only three shelves or tables are necessary; one for developing, another for the trays, and a third for changing the plates. Too many shelves or tables will be found a hindrance, since one is likely to knock against them when moving about in the dark. A sink with running water will be found a great convenience, but it is not essential. For the needs of the average amateur it is a very simple matter to carry in whatever water is required. The waste may be poured into a pail and carried out when you finally "light up." A great variety of ruby lanterns may be bought very cheaply, using either candles, oil, or electricity. A lantern with a convenient "turn down" de-

## THE NEGATIVE

vice is best, so that one can raise or lower the wick and control the strength of the light. Should the lamp have only one fixed light, it is a simple matter, however, to veil it. In developing highly sensitive plates, cover the tray or keep it at a distance from the light. An artificial light is always the best, since it does not vary. It is not desirable to use a window opening out of doors for your red light, since the light varies at different hours of the day, or it may be affected by a passing cloud. When working by an unchanging light you come to judge your negative by a fixed standard, while if the light constantly varies it is easy to misjudge the intensity of your plate.

There is no such thing as a perfectly safe light which is at the same time bright enough to allow a close examination of your plate. Ruby glass is the best for the purpose, but it is well to diffuse the light by covering it with several sheets of yellow tissue paper. To be quite safe, shut off your red light and open your plate holders, or unroll your films, in perfect darkness or at least at some distance from the lamp and only expose it to the red light from time to time as you watch for the image. The plate is especially sensitive until it has

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been covered with the developer. After you have selected your light, test it by exposing a plate in a holder with the slide half drawn and develop in perfect darkness. Should you see any difference in the exposed part of the plate you may be sure the light is not safe.

For ordinary developing you will need but three trays. It is better to have your table or shelf as clear as possible of all unnecessary furniture. One can follow a personal preference for granite, rubber, porcelain, or glass trays. It will be found an excellent plan to have the trays of different sizes, or at least of distinctive shapes, so that you will not be in doubt as to which is which when handling in the dark. There are a variety of grooved tanks and similar receptacles for washing plates which may be bought very cheaply. It will be found convenient to have a small light-tight box with a lid, or a closet or cupboard where a partially developed plate may be placed in case one is called suddenly from the dark room, or must "light up" for some unforeseen reason. As a rule, it is best to buy chemicals in small quantities, even if it is somewhat more expensive to do so. Most of these materials do not improve with time. A place

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should be arranged where the negatives may be set to dry in a warm current of air. Too warm air, by the way, will intensify your negatives. It is a good plan never to move the negatives while they are drying since they may become marked.

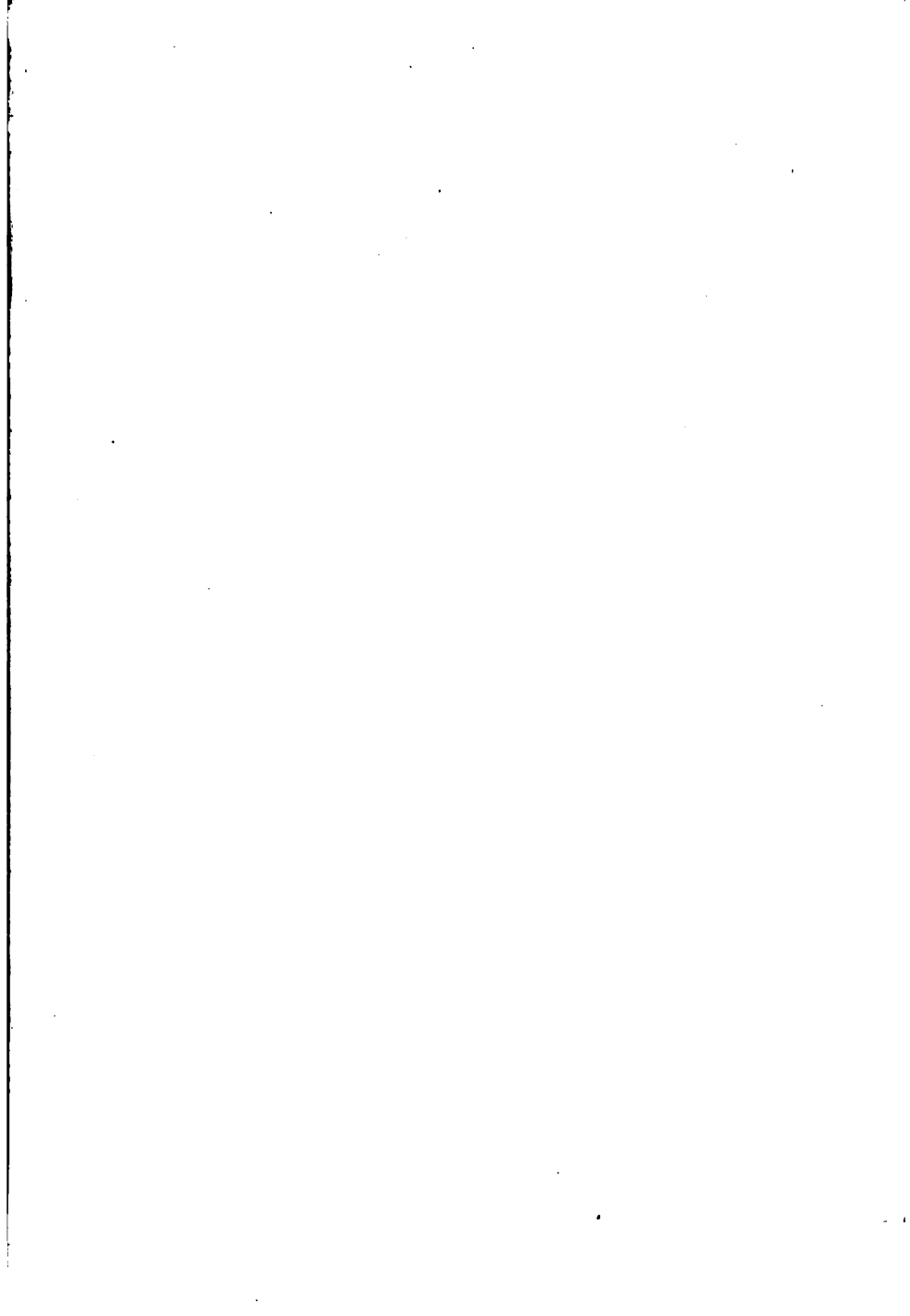
The temperature of the developing bath should never be more than seventy degrees nor less than sixty degrees. This allows a fairly wide margin. The dark room should be kept at about the same temperature. A too warm developer will produce a heavy, flat negative. The importance of the temperature of the developer is often overlooked. A difference of ten degrees will make the image appear more quickly or slowly, and one may readily misjudge the right time for stopping the development. An experienced photographer may thus be led to plunge his imperfectly developed plate into the fixing bath and miss the chance of securing a good negative when the exposure has been correct. In developing try to give your plates a warm black tone with a slight tinge of olive since these are the most satisfactory for printing.

It is a common error to imagine that once the plate is developed all danger of injury is

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past. Since the fixing solution is very cheap it is well to double the quantity so that the bath will not be overworked. As soon as the fixing solution becomes discolored, it should be thrown out and a new bath prepared. It is a good rule to let the negative remain in the fixing solution double the time it takes to remove the white appearance on the back. In washing the plate have the water cold, since warm or even lukewarm water tends to soften the emulsion. Bear in mind that fifteen minutes' washing in running water is equal to one hour in an ordinary tank. Dry the negative quickly in fresh air, since slow drying in a bad atmosphere may destroy the finer details. A sudden change in temperature may cause unequal density.

Great attention has been paid of late to furnishing plates which will produce special results. Compare the average amateur photographs of to-day with those of a decade or more ago and the improvement is at once obvious. This is very largely due to the general use of special plates for special purposes. In landscape work, for instance, the beginner is often disappointed to find his picture come out very flat with black shadows while the original





Scene from "Pickwick Papers," dramatized for the movies in an English Village



Mr. Pickwick (John Bunny) visits Bury St. Edmunds



## THE NEGATIVE

was full of light and color. He has failed to appreciate the fact that his camera cannot reproduce the beautiful picture on his ground glass because the colors have unexpected photographic values. His negatives will be greatly improved, if he will use some brand of orthochromatic plate which will equalize the color values. A color screen may often be used to advantage. The exposure will have to be considerably lengthened, but this makes little difference as a rule in landscape work. In interior work again the amateur is often bothered with the halation about open windows, doors, and mirrors, or the polished woodwork of a room. Special plates are prepared with double coating which assure sharp details even in the high lights. Portrait work presents probably more difficulties for the amateur than any other branch of photography. Try as he will, he often cannot produce a good likeness, or the contacts will be harsh and lacking in soft details. These difficulties are largely overcome by using a special portrait plate which has an exceedingly fine grain and offers great latitude in the exposure. Special plates may also be had for flash-light work and for copying.

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Great care should be taken of the plates before as well as after the exposure. All plates should be kept in a cool, dry place. It is important that the ventilation should be good and that no gases reach them. The plates should be stacked on edge and care should be taken not to let them fall, or to strike their edges thus causing chipping or breakage. In storing plates always put them face to face and do not touch the emulsion with the fingers. If they need dusting, go over them with a fine camel's-hair brush.

## CHAPTER XVI

### THE PRINT

**I**N earlier days many amateur photographers came to grief in printing their negatives. The old-fashioned silver prints proved very tricky. The silver paper had to be fresh and was very perishable, it must be over printed and reduced, and the proper tone was very elusive. The so-called gas-light papers have done away with these perplexities. The printing process to-day is so simple and free from pitfalls that the first print is usually satisfactory. With very little experience surprisingly attractive pictures may be taken. It is but one more step to producing highly artistic work.

One of the great advantages of the gas-light papers is the latitude they allow. There are so many grades that a paper may be found to meet the needs of almost any negative. Even if the amateur fails in hitting upon the right exposure, or by misjudgment in develop-

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ing has made a very unsatisfactory negative, a careful selection of the paper will in the end make a good print. As he acquires more skill and experience, this flexibility enables him to bring out the latent beauties of a negative.

These papers come in a variety of degrees of sensitiveness and with many different finishes and tones. A print may be highly glossed, or have a dull finish as best suits the nature of the picture, and the paper may be very thin or so heavy that no mount is required. Some are especially suited for making contrasts or well-defined prints from very weak or flat negatives. Others will produce normal prints from very harsh negatives in which the high lights contrast violently with the shadows. In the old days both these negatives would have been useless since so much of the detail would have been lost.

The requisites for printing these papers are very simple. The entire operation is practically independent of any ruby light. The prints were given the name of gas-light papers at first because they could be made at night by gas or other artificial light, whereas for silver papers or solio prints plenty of daylight, even

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sunlight was essential. An even greater advantage lies in the fact that they may be worked in daylight, and one can readily improvise a dark room at home or on a vacation in the open air. The papers may be developed in daylight. A bright ruby or even yellow light will suffice to make the process absolutely safe. A sheet of yellow tissue paper placed around an electric bulb, or before a lamp, will guard the papers while keeping light enough to watch every detail of the process without squinting.

The furniture of this "dark room" may be of the simplest. The paper is printed in the ordinary printing frame. Where a great deal of work is to be done an ingenious printing machine is employed. This consists of a table in which is set a sheet of glass and below it an electric light. In printing, the negative is laid face up on the glass, a sheet of sensitized paper is placed over it, and a back is brought down to hold the paper in position. The light is turned on and off by a switch in a convenient position and the print has been exposed. The entire operation is done with the least possible exertion. A home-made printing table may be easily arranged which will be found very con-

## THE CAMERA MAN

venient. The simplest way is to cut a hole a little smaller than the printing frame in some shelf or table and place an electric bulb light beneath it. When you have loaded your printing frame, turn it face down over the apparatus, and turn on your light.

Obviously the sensitized paper should be well protected from the light and kept at a low temperature. In picking up the sheets, you may be puzzled as to which is the sensitized side. The simplest test is to bite a corner of the sheet when the right side will stick slightly to the teeth. The exposure may be made with daylight, electric light, gas, or lamplight. Be sure that the light falls evenly on the plate. The negative should be held exactly at right angles to the source of light, and usually at a distance equal to about the diagonal of the plate.

A few seconds will suffice for the exposure. The length depends so much upon the density of the plate that it is impossible to lay down any hard and fast rules. A normal negative which would require an exposure of ten seconds before a Welsch burner would need twenty seconds before a thirty-candle-power electric bulb or an ordinary gas burner, and

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about twice this length of time before an ordinary oil lamp. It is a very simple matter to test your negative by cutting a sheet of the paper you are using into strips and making test exposures with one or two of the strips. On developing, which is the work of only a few moments, you will soon ascertain which exposure is best. It is a simple matter to judge the proper exposure of other negatives by comparing them with the first one exposed.

The only other essential furniture of your "dark room" will be three trays which should be placed in a row for convenience. The first of these holds your developer, the second clean water, and the third the fixing solution. Keep the trays close together, so that you can transfer the prints quickly from one to another without dripping. It will be found convenient to have a cloth lying between the second and third trays to dry one's hands. The clean water in the second tray will partially wash away the developer or fixer from your fingers, but make sure of this before touching a piece of undeveloped paper. Keep the developing solution at seventy degrees and the clean water and the fixing solution at fifty degrees. A too

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warm developer may fog and soften your prints.

In developing, place the exposed print face up in the solution in tray one, and have the fluid flow quickly and evenly over its entire surface. If the developer does not cover the print at once the image may come up unevenly. With an average negative and proper exposure the image should appear in a moment and ten or fifteen seconds will suffice for the development. It is absolutely essential that your hands should be clean, since the slightest trace of the fixing solution will stain and ruin your print. The moment the image reaches the proper degree of clearness and strength, transfer it to the tray of clean water and rinse it off several times before it is transferred to the fixing bath. About fifteen minutes will be required to fix the print; then it should be thoroughly washed in running water for half an hour.

The danger point has not been passed until the print has been thoroughly washed. Even after the image leaps up in the developer and grows into a complete picture, many slips are possible which may destroy it. Some of the papers are so prepared that after the picture





Scene from Homer's "Iliad" dramatized on the shores of Greece



Scene from Dante's "Inferno" staged in Italy



## THE PRINT

has reached its proper depth there is a pause in the development which gives one ample time to examine it closely and transfer it to the washing tray and the fixing bath. An under-exposed print must be forced past this point, while an over-exposed print must be taken quickly from the bath before it has been reached. An under-exposed print comes up very slowly, while an over-exposed picture will leap quickly into life and be heavy in tone.

It is a very simple matter to get your fixing solution down to fifty degrees. As the crystals dissolve they lower the temperature of the water, and tend to keep it well below that of the room for some time. In very warm weather a little ice may be added. As a precaution it is safe to add some hardening solution. A fixing bath which has been used for plates or films should never be used for paper. In washing the prints after fixing, be sure that the water reaches both sides of the paper. It is a common mistake to throw several prints into the water at the same time where they may stick so closely that the water has little opportunity to clear the emulsion.

Not every amateur photographer succeeds at first in making good pictures. "What is the

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matter with my prints?" is a common question. The answer is, as a rule, very simple, and an experienced camera-man can tell at a glance wherein lies the trouble. A few rules will help the amateur to answer the more perplexing questions for himself. Is your print too black? The chances are that you have exposed or developed it too long. A weak or thin negative may also be responsible for the trouble. You may have made the rather stupid blunder again of putting your paper into the printing frame upside down. If the negative be at fault, try a softer grade of paper.

When prints are too light and are lacking in detail the trouble will usually be found in the negative. A softer paper may correct this. If the negative is good, try a longer exposure. A slight fogging of the paper may occur and this is readily indicated by a grayish appearance of the whites in the print. Some prints come from the developing tray with an unpleasant grayish mottled appearance in every part of the picture. This is likely to be caused by a too short exposure and from the forcing of the development. Paper which has been kept in a damp place often has this appearance.

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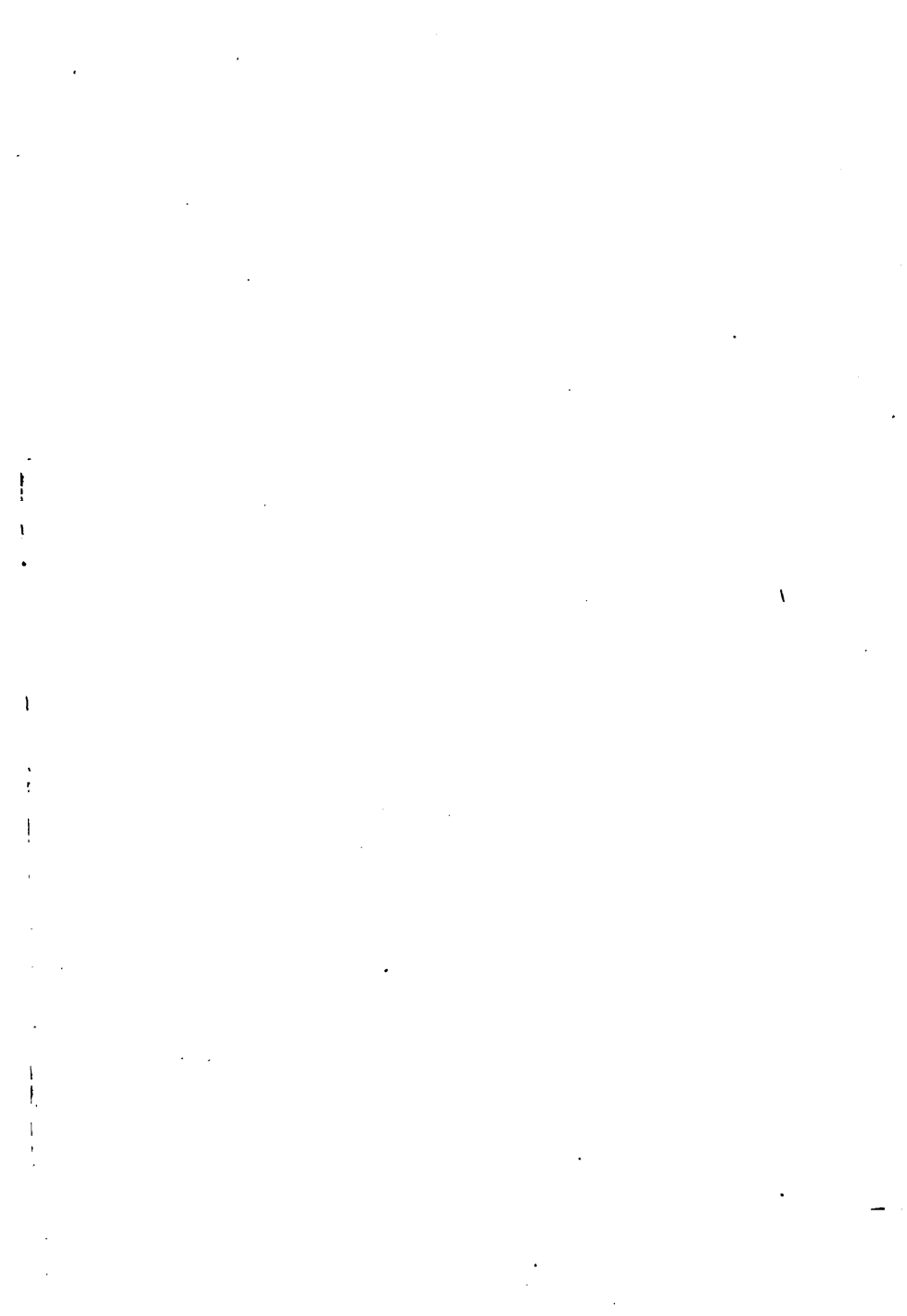
Under-exposure and forcing will often produce greenish-yellow stains, or these stains may be caused by a developer which has been kept too long and been allowed to become stale. A too warm developer will also stain the print usually to a brown or reddish color. The commonest stains of all are the yellow spots which come from the presence of hypo in the developing bath. A trace of hypo on your fingers when taking up and touching the print before developing will cause the same effect.

The beginner is often puzzled by the appearance of round white spots scattered over his picture when the image is otherwise perfect. They come almost invariably from air bubbles which have formed as the developer was run over the print. A little experience in running the developer quickly and smoothly over the paper will prevent this. Should the bubbles appear, brush them away with a fine camel's-hair brush. Another common blemish is the blistering of the print. There are several explanations for this. If the paper has been creased, broken or otherwise abused, the blisters may appear. The constant dropping of water on the print in the washing tray or a

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too great contrast in the temperatures of the developing and fixing baths and the washing water, will produce the same effect.

**THE END**



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